JUNIOR HIGH SCHOOL
GRADES 7-8-9

INDUSTRIAL EDUCATION
Curriculum Guide

Alberta

EDUCATION
1982

ACKNOWLEDGEMENTS

Alberta Education acknowledges with appreciation the contribution of the following Ad Hoc Committee members to the preparation of this Guide.

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NOTE: This Curriculum Guide is a service publication only. The Junior High School Program of Studies contains the official statement concerning Junior High School courses. The information contained in the Guide is prescriptive insofar as it duplicates that contained in the Program of Studies. There are in the Guide, however, as well as content, methods of developing the concepts, suggestions for the use of teaching aids and lists of additional reference books.

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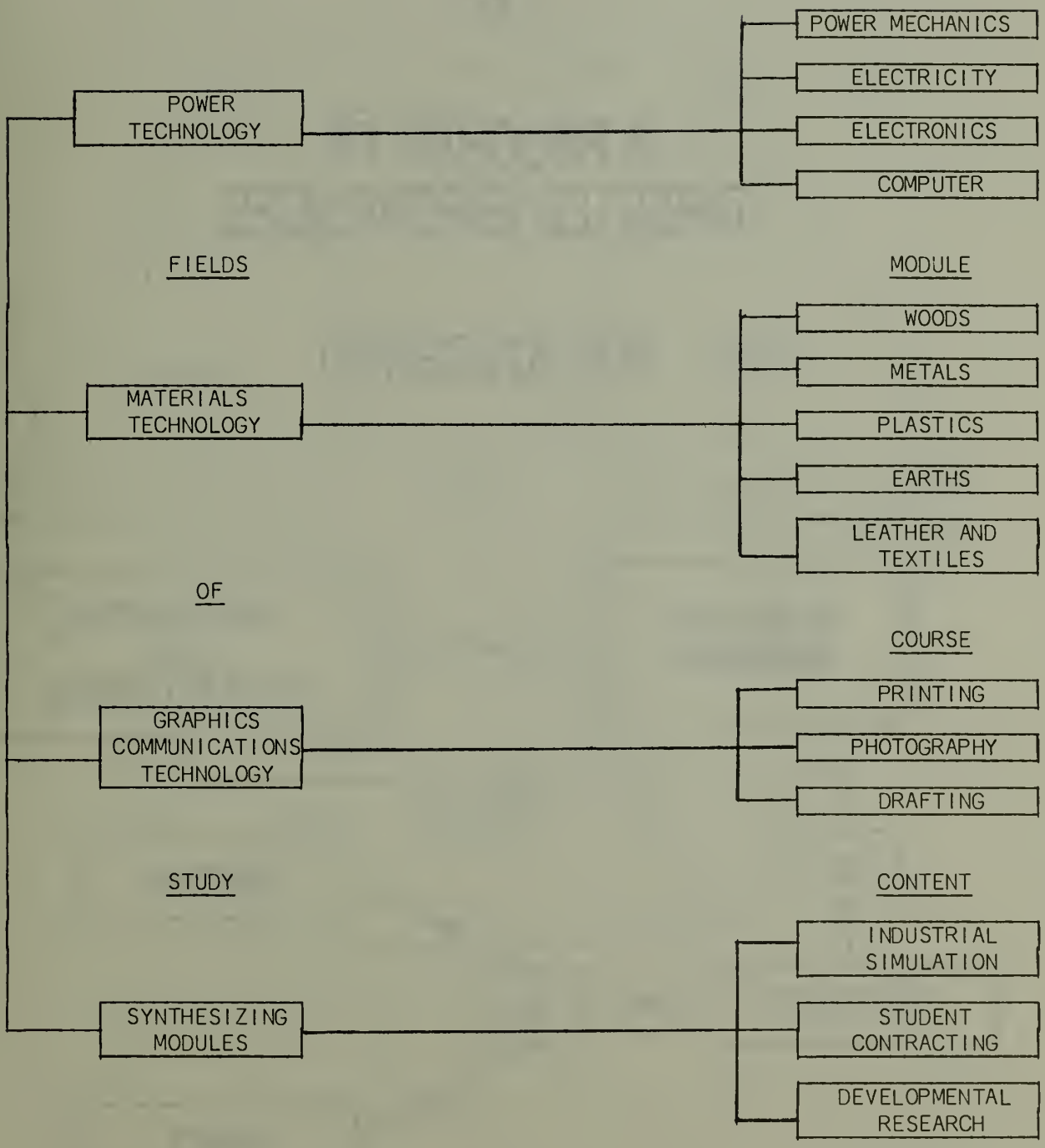
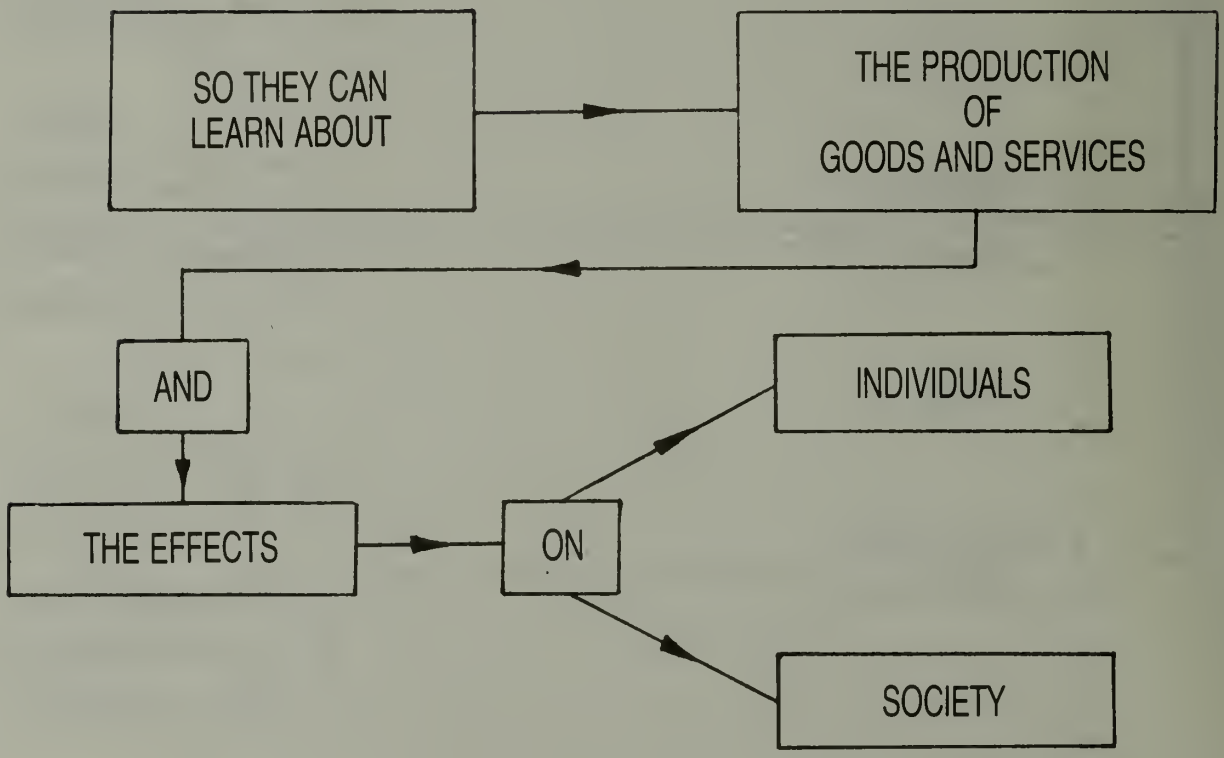


JUNIOR HIGH INDUSTRIAL EDUCATION

IS

A PROGRAM OF DIRECTED EXPERIENCES

FOR STUDENTS!



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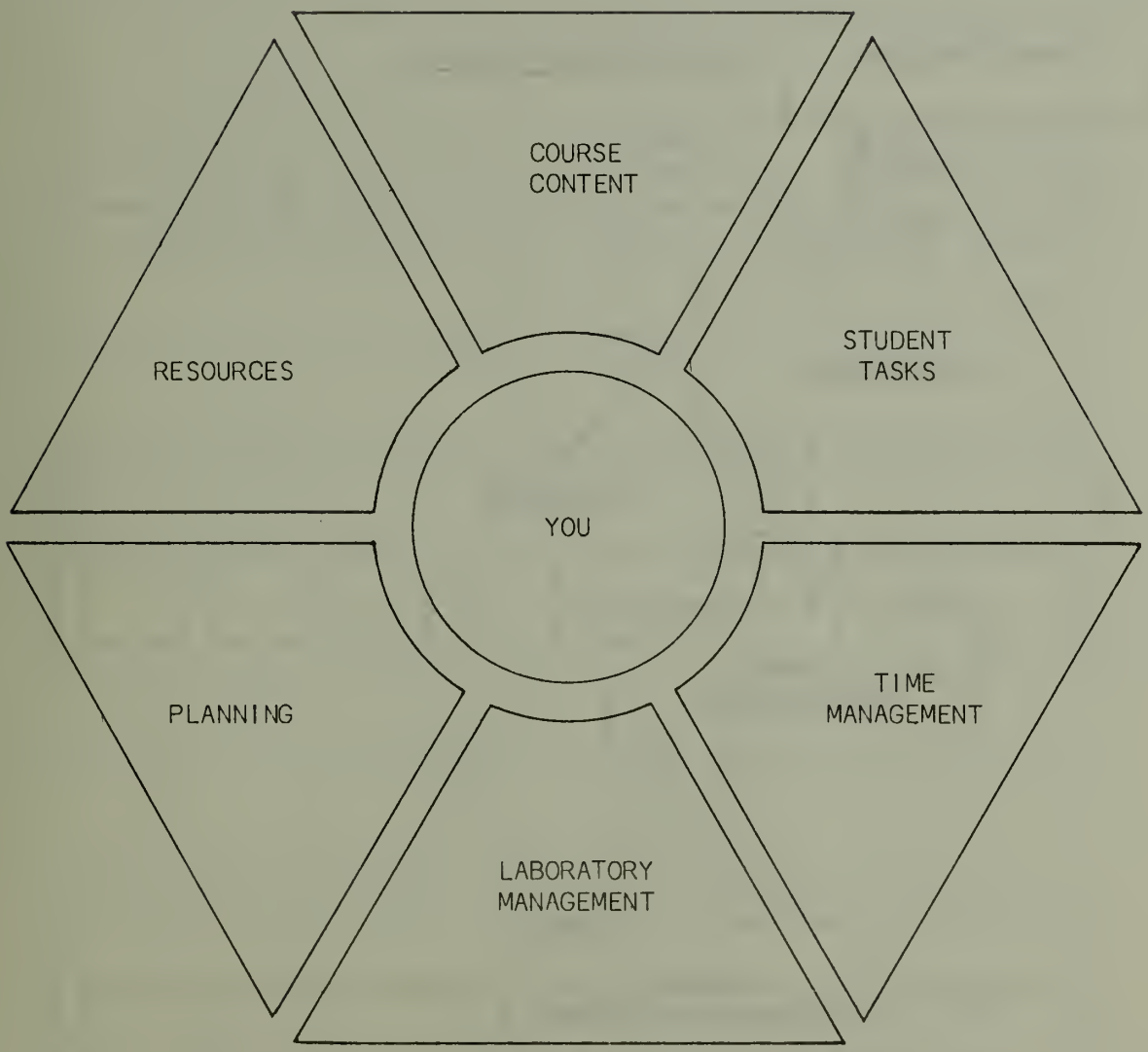

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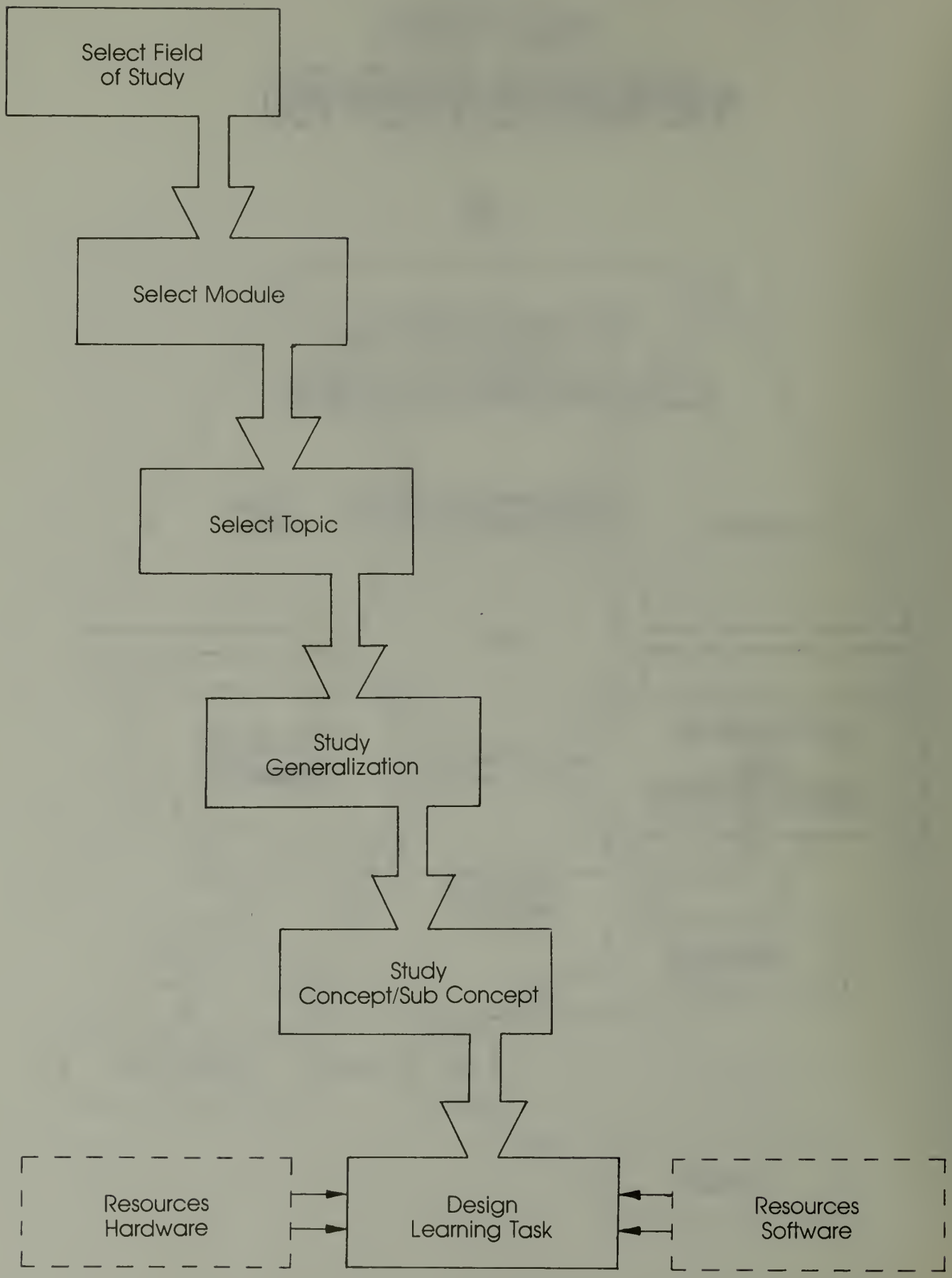
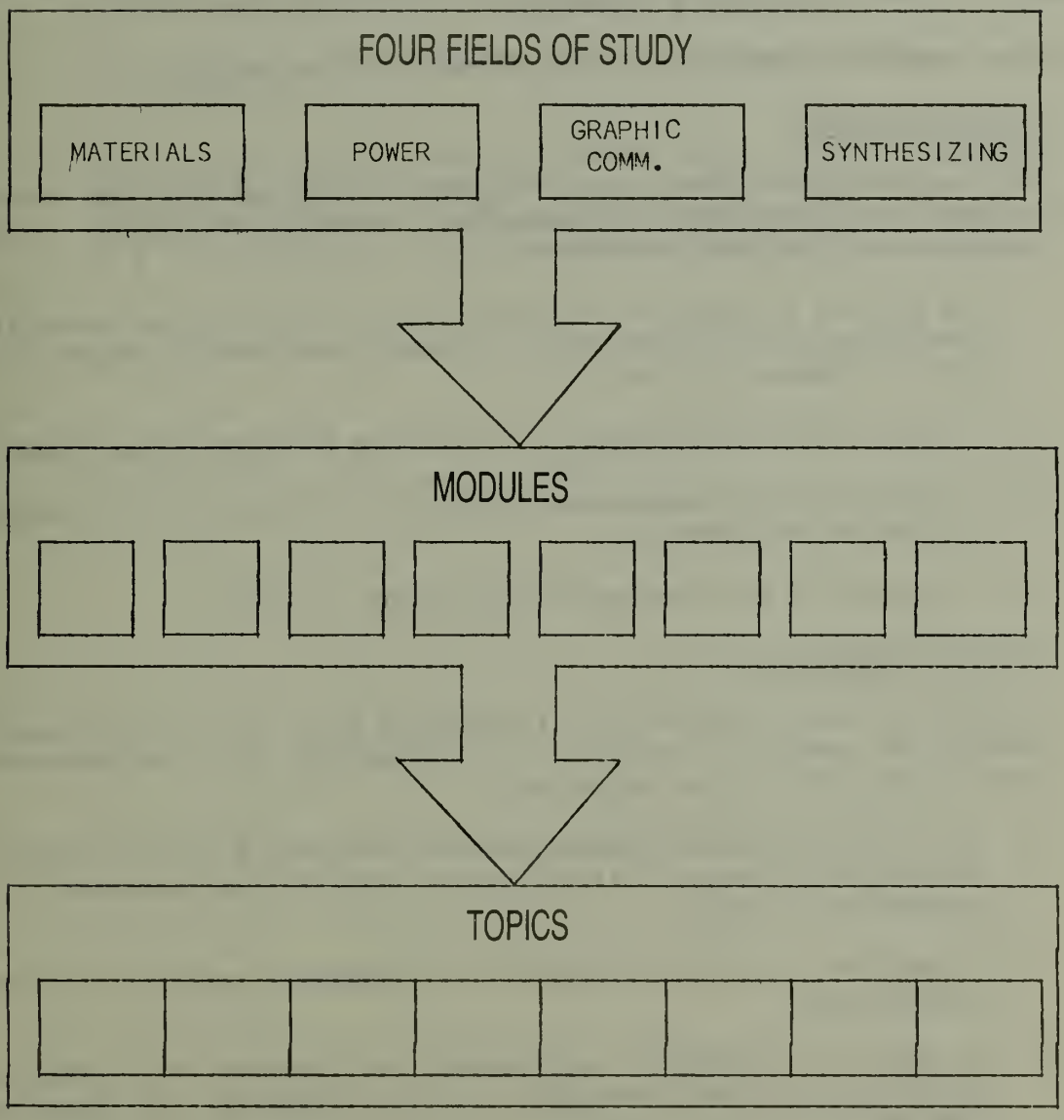


ALBERTA MULTIPLE-ACTIVITY 7, 8, 9 INDUSTRIAL EDUCATION PROGRAM



OBJECTIVES

INTRODUCTION

The junior high school industrial education program in Alberta is part of a continuum of educational experiences to be gained from participating in the broader program of industrial education which extends from familiarization experiences at the elementary level and extending through to career choice and preparation at the high school level.

The specific objectives for the junior high program are:

A. Personal Growth:

To provide opportunities for the individual growth of the student through the development of acceptable personal and social values necessary in a productive society.

1. To provide a technical environment which motivates and stimulates individuals to discover their interests and develop personal and social responsibilities.

2. To assist in the development of positive attitudes toward safety.

3. To assist in the development of positive attitudes toward conservation and environment.

4. To assist in the development of consumer literacy.

B. Career Exploration:

To develop basic competencies, integrating cognitive and psychomotor skills to enter a family of occupations or post-secondary institutions for further education.

1. To provide exploratory experiences in the use of tools, equipment and materials appropriate to various technologies prevalent in a productive society.

2. To develop an understanding of the interrelationship of various technologies.

3. To provide a technical environment for students to synthesize their accumulated knowledge in the solution of practical problems.

4. To assist the student to develop habits that will be conducive to the establishment of a safe environment.

C. Occupational Skills:

To develop basic competencies, integrating cognitive and psychomotor skills related to families of occupations.

1. To provide safe exploratory experiences in the use of tools, energy, equipment and materials appropriate to various technologies prevalent in a productive society.

2. To develop an understanding of the interrelationships of various technologies.

3. To provide a technical environment which permits students to synthesize their accumulated knowledge in the solution of practical problems, and to assist students to develop habits that will be conducive to the establishment of a safe environment.

PROGRAM DESCRIPTION

A. Organization:

The Alberta Multiple Activities Program is an organizational device through which a variety of technology-based, exploratory experiences, can be presented in a minimum of space with a minimum of equipment. The laboratory is organized into a number of different areas representing components of the fields of study. Some Alberta school jurisdictions have opted to build separate laboratories representing each field of study (or a combination of one or more fields) rather than housing the entire program within a single laboratory. Each area within a laboratory is as self-contained as possible with provisions made for the storage of tools, products, and stock within it. The class is divided into three or more groups with each group working through the course content in the assigned area.

The modules, to be taught in nine to twelve weeks, are designed in such a way as to allow for adequate orientation, organization and planning time. Beginning lessons, demonstrations and introductory safety discussions are recognized as being an integral part of Industrial Education and as such require generous time allotment.

It is imperative that ample preplanning be done prior to attempting a multiple activities teaching approach.

B. Fields of Study:

To provide for a breadth of exploratory experiences, the junior high industrial education program is divided into four fields of study which are further divided into fifteen modules. Each module represents fifteen to twenty-five hours of study. During the junior high school years it is recommended that a student study a minimum of three different modules each year. In junior high schools where Industrial Education is taught for two years only, it is recommended that four different modules per year be studied. In any case, it is recommended that a student participate in an Industrial Education program a total of two hundred and twenty-five hours averaged over the three years that the student is attending junior high school in Alberta.

Fields of Study	Modules
Power Technology	Power Mechanics Electricity Electronics Computer
Materials Technology	Woods Metals Plastics Earths Leather and Textiles
Graphic Communications Technology	Printing Photography Technical Drawing
Synthesizing	Industrial Simulation Student Contracting Developmental Research

Power Technology, Materials Technology, and Graphic Communications Technology are fields of study which are designed to teach specific technology content by topic. For the most part, learning tasks are accomplished through "hands on" activity, lecture, demonstration, research, or audiovisual techniques.

The Synthesizing modules constitute a fourth field of study. This field is designed to show the interrelationships of the various technologies. It enables students to synthesize their accumulated knowledge through simulation and student contracting modules. The Developmental Research Unit is to be used for teacher research into new program content. The teacher must define the content of this unit and obtain the approval of the Provincial Consultant of Industrial Education and his/her principal before introducing it to the students.

C. Modules:

The number of modules programmed provide for a wide range of possibilities for organization. The modules are not dependent upon any sequential development; therefore, any module could be used as an introductory module. It is recommended that the Power Technology modules, Materials Technology modules, and Graphic Communications modules be studied at or near the beginning of the students' overall industrial education program. The Synthesizing modules should not be attempted until the students have had experience in the other fields of study.

D. Length of Program:

As stated in the Junior Senior High School Handbook, the recommended minimum time allotment for Industrial Education at the Junior High School level is seventy-five hours (75 hours) each year (225 hours over 3 years).

It is imperative that realistic time lines be established and followed in order to ensure that the course objectives will be reached.

E. Organization of Industrial Education Laboratories:

The industrial education area is designed as a multiple activity laboratory. Each school program should have all the fields of instruction represented in one or more facility.

Each work station should contain the tools, equipment and materials required to complete the unit. Adequate floor area should be provided to accommodate a comfortable arrangement for the students working in each station.

As the laboratory work proceeds, small groups of four to six students would be found pursuing activities at three or four of the stations. Following the completion of the outlined learning experiences in a unit, the group proceeds to the next station and engages in studying a related activity.

This system of rotation insures that each student has been introduced to all the components of the program as outlined in the teacher's plan book.

A multiple activity laboratory provides the opportunity to observe the interdependence of technologies and to work with the basic tools, machines, materials, and processes in each of the technologies.

F. Approach:

The product, an important and at time a central ingredient in industrial education instruction, should be considered to be a vehicle through which instruction takes place. When the product becomes the focal point and ceases to be a medium for this learning experience it should be re-evaluated. The woods, metals and plastics units lend themselves well to the product method. The products, however, should be predesigned and permit a measure of successful achievement for all levels of learning. Units such as electricity, electronics, computer technology, and power mechanics lend themselves well to an experimental approach.

Predesigned and programmed laboratory exercises will assist in the degree of student understanding. The teacher should have available instructional materials of many types such as workbooks, A.I.D.s, films, slides and manuals.

G. Student Personnel System:

A student personnel system, under the direction of the teacher, should be planned to allow students to make decisions and assume responsibilities for their decision-making.

H. Scope of Program:

The scope of Alberta industrial education includes studies and experiences in the major technologies. All pupils should have the opportunity to explore the fields.

I. Evaluation:

Evaluation is a necessary and important component of education. It is the part of the system that indicates how effectively objectives are being met. One important principle in evaluation is that pupils should know precisely how their work and efforts are being evaluated. For ongoing evaluation to be effective, accurate records of pupil achievement must be maintained and reported at regular intervals to appropriate interested and responsible parties (e.g., pupil, parent, school administration).

It is suggested that a variety of evaluation techniques be employed. Evaluation ought to be undertaken in the three domains of learning (affective, cognitive, psychomotor) and in accordance with jurisdiction policy.

Some considerations in the evaluating of pupil progress in the three domains are:

Affective (Personal growth)	Cognitive (Understanding of subject matter)	Psychomotor (Product)
- cooperation	- quiz	- accuracy
- safety awareness	- research reports	- tool skills
- punctuality	- work sheets	- aesthetics
- deportment	- tests	- finish
		- presentation

DEFINITION OF TERMS

The following is a definition of terms used with the industrial education program:

1. Multiple Activity Laboratory:

   A laboratory where three or more activities are in progress at the same time.

2. Field of Study:

   The general title given to the basic technologies represented, e.g., Materials, Graphic Communications.

3. Module:

   A module consists of from 15 to 25 hours of work in a field. There may be several modules to complete a field, e.g., Woods, Metals, Plastics, Earths, Leather and Textiles in the Materials field.

4. Predesigned Products:

   Students at the junior high school level may not have the background or knowledge of tools and materials to design their own products. The teacher should exercise care in the designing of products to best meet the needs of the student as outlined in the course objectives.

5. Instruction Sheets:

   These are supplemental teaching materials which contain organized material for the use of individual students. There are four common types.

   a. Operation Sheet:

      Gives directions on how to perform a single manipulative task. This would include the directions on how to operate a machine.

   b. Job Sheet:

      Gives directions on how to do, completely and in a proper sequence, a number of operations. The procedure for making a product or doing an experiment would constitute a job sheet.

c. Information Sheet:

Contains everything necessary for the understanding of an instructional unit which is largely informational in nature.

d. Assignment Sheet:

Directs the study to be done by the student on a lesson topic, and may include questions to determine how well a lesson has been learned.

6. Student Manual:

The manual outlines in detail specific activities and assignments students are to do. This is a "guide" for the students to follow. It includes instructions to read specific pages in reference books, to view a filmstrip, to work out given problems and/or to outline the procedure for an activity.

7. Articulated Instructional Development Booklets (A.I.D.):

The booklets were developed to provide sequential pictorial instruction for the fabrication of products. Developed into the booklets is a Check Point System which controls both the quality of the product produced and student safety.

8. Sequential Pictorial Instruction Books:

These books provide a sequence of pictures that illustrate the sequential procedures to be followed in performing a specific operation or process.

SAFETY EDUCATION PROGRAM

Each industrial education laboratory must have an effective safety program. This does not mean that the promulgation of a set of rules and regulations will satisfy this end. Students must be taught in each and every subject studied within the industrial education framework, the "hows and whys" inherent in the safety program. It is the responsibility of the teacher to supply continuous and vigilant supervision and to ensure that all students engage in only safe laboratory practices. A good safety program would include:

1. Machine guards and operating procedures approved or recommended by the Workers' Health, Safety and Compensation Department.

2. Regular and thorough instruction and revision.

3. Constant vigilance.

4. Checking and evaluating of student safety habits by the teacher.

5. Complete first aid equipment kept in first-class condition.

6. Non-skid material and clearly marked working areas around all machinery.

7. Proper clothing, with particular attention to eye protection.

8. Machines and tools in good working condition.

9. Routine reporting and recording of all accidents.

10. Good housekeeping.

The following are samples of safety regulations which the teacher might be expected to enforce:

1. No power machines shall be used by any student before specific instruction has been given with regard to safe operation and safety precautions.

2. No power machine shall be used while the instructor is absent from the laboratory.

3. A student shall not use a machine unless it is equipped with approved guards.

4. Approved eye protection must be worn for certain operations.

NOTE: A good safety slogan which should be put into practice at all times is:

"A PLACE FOR EVERYTHING AND EVERYTHING IN ITS PLACE."

There are seven basic steps in safety education:

1. Be familiar with Workers' Compensation Regulations.

2. Set a good safety example for students.

3. Instruct each student thoroughly in the safety precautions of his/her job.

4. Keep all tools sharp and in good condition.

5. Keep all safety devices in proper use.

6. Follow up safety instructions constantly. The laboratory will be as safe as the teacher makes it.

7. Report accidents promptly to some senior school authority. If no other person is designated, this authority is the Principal.

Dress and deportment play an important part in the operation of a safe program. Students and teacher should be neatly dressed at all times and the teacher should take care to ensure that no loose and dangerous clothing is worn. Safety apron, goggles, gloves and face shield should be used wherever necessary.

Each school should request the excellent publications, bulletins, and A/V material dealing with accident prevention and safety procedures distributed by the Occupational Health and Safety Division of Workers' Health, Safety and Compensation.

Guest speakers may be available upon request.

GENERAL INFORMATION

1. Records

Every teacher should keep the following records:

a) Attendance.

b) Daily plan (activities, demonstrations, follow-up).

c) Group rotation plan for the year.

d) Record of student achievement (test marks, product rating, etc.).

e) Inventory of equipment and supplies.

f) Student personnel system.

g) Any other records that are deemed necessary.

2. Size of Classes

The organization of the physical facilities is in part determined by the original plan. There are, however, adjustments that can be made in the layout by the teacher to accommodate his/her style of teaching. The number of students in a class affects the way the lab or shop is organized. While most of the shops in Alberta are designed for 16 to 20 students, a number of factors must be considered in the final assignment of class load. These factors include:

a) physical size of the shop or laboratory;
b) type of student;
c) amount of equipment;
d) type of programming;
e) type of course;
f) training and experience of the teacher.

Safety of the students and their opportunity to obtain teacher contact are important considerations when class loads are determined.

3. Laboratory Accommodation and Equipment

An industrial education equipment list is available from the industrial education, consultant, Alberta Education.

4. School Opening

Several days should be spent at the school preparing the program and the laboratory prior to opening day. The following points should be checked:

a) Examine the inventory. All tools should have been repaired, sharpened and properly stored.

b) Go over materials on hand. There should be material on hand to provide for the first rotation.

c) Plan your year's program. Prepare a broad outline of the year's work in each grade. Have dates set for the time of rotation, when the groups change their activities.

d) Prepare the information and job sheets necessary to provide for a successful beginning to your program.

e) Have the products selected for each area in which they are required.

f) Have a student record system prepared.

g) Survey product storage space and have lockers assigned by classes. Specific lockers can be given to students later.

h) Have a general information sheet prepared for each student, outlining general laboratory procedures and rules, fees required, evaluation criteria and other information you find pertinent.

i) If your system has a book rental scheme, make arrangements to have the initial laboratory fee collected by the book rental secretary.

j) Examine fire prevention equipment to see that it is functional.

k) Develop a comprehensive safety program (charts, regulations, safety zones, etc.).

5. Laboratory Closing

At the end of the school year the teacher must ensure that:

a) The inventory is checked and reported to the Principal or Secretary-Treasurer.

b) The student's accounts are audited by a responsible authority, usually the Principal.

c) The tools are sharpened and needed repairs are ordered.

d) The tools are either oiled or waxed and put in a secure location.

e) The laboratory is thoroughly cleaned and left in creditable condition.

f) The materials that will be needed in the first quarter of the next term are ordered.

g) An inventory of instructional materials is taken and sufficient preparation is made to get started in the fall.

h) Rag bins and paint room supplies are checked. (Discard all soiled rags.)

i) Batteries are removed from electronic equipment, meters, etc.

j) Remove tension on belts on lathes, etc.

k) Student lockers are cleaned out.

l) Painting is done where needed and laboratory coats and aprons cleaned.

6. Provision for Custodial Services

Daily complete caretaking services are required to keep an industrial education laboratory functional thus allowing maximum time for instructional purposes. Teachers are requested to become familiar with individual school jurisdiction policy concerning the caretaking services available to the various industrial education departments throughout a school system. It is expected that a pupil be taught to maintain a clean working environment by participating in a scheduled laboratory clean-up plan.

REFERENCES

Primary references should be selected on the basis of the modules taught.

1. Build-a-Course Series. Goodheart-Willcox

Woodworking	Wagner
Metalworking	Boyd
Plastics	Cope D.
Graphic Arts	Kagy F.
Electricity	Gerrish H.H.
Drafting	Brown W.E.
Power Mechanics	Atteberry P.H.

2. Basic Industrial Arts Build-a-Course Series: McKnight Publishing Co. (Van Nostrand Reinhold Ltd.)

Woodworking	W.R. Miller & W.H. Zook
Metalworking	W.R. Miller & V.E. Repp
Plastics	W.R. Miller & G.L. Steele
Graphic Arts	W.R. Miller & R.J. Broekhuizen
Photography	W.R. Miller
Electricity	W.R. Miller & E. Francis
Drafting	W.R. Miller & Stan Ross
Power Mechanics	W.R. Miller

Supplementary References:

CONTENT SUMMARY:

Power Technology

Module 1. Power Mechanics

- small engines, analysis, trouble shooting, fluid power, control devices, transmission devices, output, environmental implications, occupational information.

Module 2. Electricity

- basic theory, measurement, control magnetism, conversion of electrical energy, safety, trouble shooting, occupational information.

Module 3. Electronics

- basic theory, components, systems circuits, communications, occupational information.

Module 4. Computers

- computer "use", computer systems, programming, programs, societal implications, occupational information.

Materials Technology

Module 1. Woods

- sources of raw material, processing, environmental implications, identification, product planning, separation processes, forming processes, conditioning processes, combining processes, occupational information.

Module 2. Metals

- sources of raw material, processing, environmental implications, identification of properties, product planning, separation processes, forming processes, conditioning processes, combining processes, occupational information.

Module 3. Plastics

- sources of raw material, processing, environmental implications, identification of properties, product planning, separation processes, forming processes, conditioning processes, combining processes, occupational information.

Module 4. Earths

- sources of ceramic and concrete materials, processing, identification of properties, product planning, separation processes, forming processes, conditioning processes, combining processes, environmental implications, occupational information.

Module 5. Leather and Textiles

- sources of raw material, processing, identification of properties, product planning, separation processes, conditioning processes, forming processes, combining processes, environmental implications, occupational information.

Graphic Communication Technology

Module 1. Printing

- lithography (offset), photo mechanical reproduction, relief printing (sign press - platen press, rubber stamp), silk screen - photo silk screen.

Module 2. Photography

- camera (light sensitive materials), darkroom (processing film - prints), advanced darkroom, audio-visual.

Module 3. Technical Drawing

- freehand sketching, instrument drawing, drawing reproduction.

Synthesizing

Module 1. Industrial Simulation

- history, production systems, systems of ownership, organization, occupational information.

Module 2. Student Contracting

- opportunity for the student to develop greater competence in an area already explored, closed, modified and open contracts.

Module 3. Developmental Research

- opportunity for the teacher to develop new content, proposal and course writing.

PRODUCTION CONSUMPTION CYCLE

Production

- Resource Utilization
- Training Program
- Efficiency

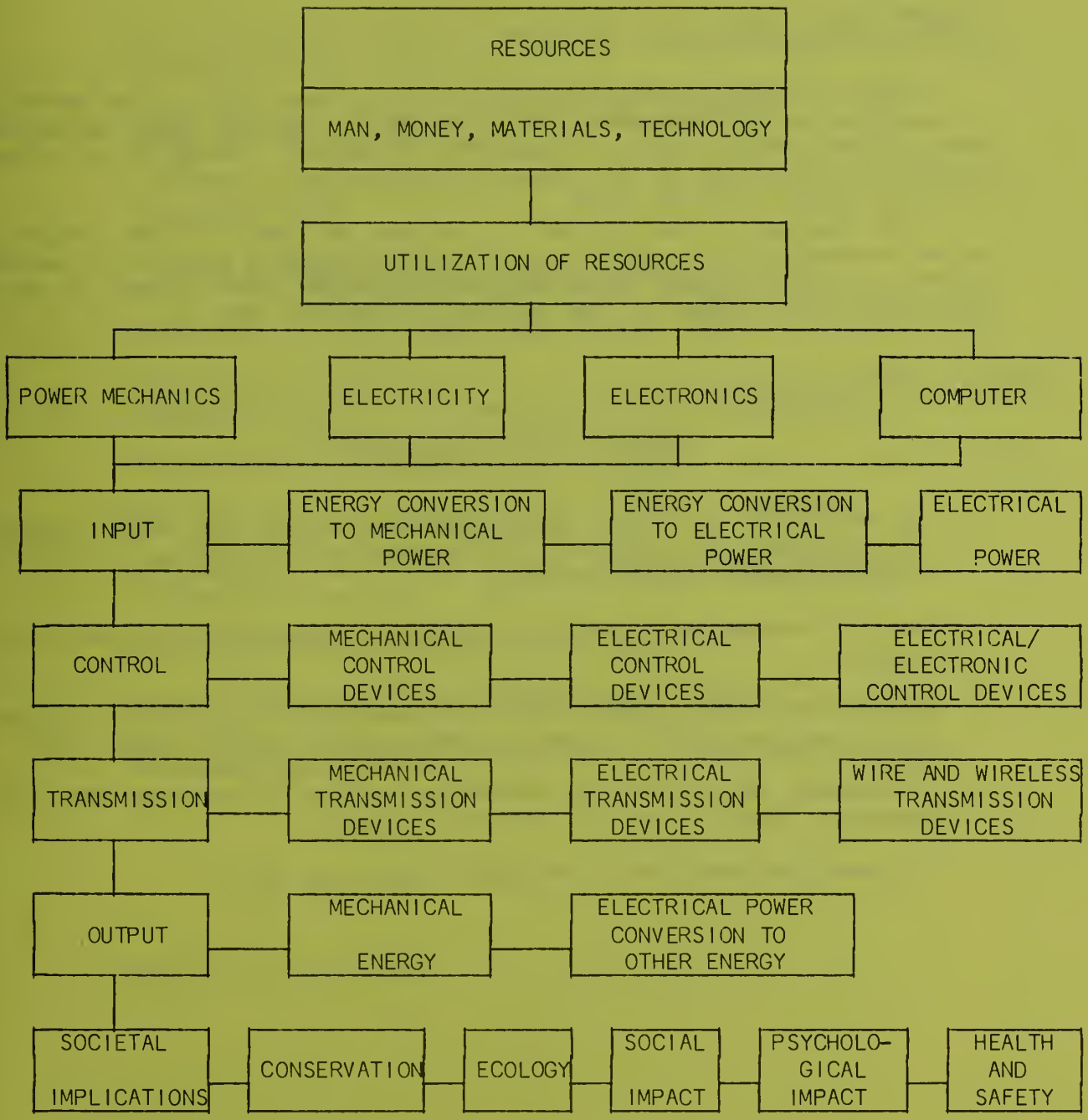
Marketing

- Research and Development
- Packaging
- Merchandizing
- Accounting

Consumerism

- Needs and Wants
- Comparison
- Selection
- Resource Limitations

FIELD OF STUDY: POWER TECHNOLOGY



POWER TECHNOLOGY

Introduction:

Power is a large inclusive concept covering many fields, from mechanics to communication and computers. Man's ability to control energy during the past 250 years has allowed our technology to expand. Energy is all around us and our utilization of this energy can determine our future.

This section of the program is designed to create in the student a better knowledge of our rapidly expanding technological society. A concept of work, energy and power should emerge through the learning tasks in which the students will engage as they progress through the area.

OBJECTIVES FOR POWER TECHNOLOGY

1. To develop in the student an appreciation of the many basic concepts and principles of science at work in power and relate these concepts to the vast area of power technology.

2. To gain knowledge of the utilization, transmission and control of power.

3. To familiarize the student with basic construction, operation, application, care and control of machines that convert power to useful work.

4. To develop problem-solving techniques related to machines and their operation, control, analysis and application.

5. To learn safe practices in the power technology area.

REFERENCES

*Atteberry, P.H. Power Mechanics, Build a Course Series, Goodheart-Willcox.

Bohn, Ralph C. and Angus J. MacDonald. Power: Mechanics of Energy Control McKnight Publishing Co.

Duffy, Joseph W. Power: Prime Mover of Technology McKnight Publishing Co.

Lowry, Peter and Field Griffith. Model Rocketry: Hobby of Tomorrow Doubleday, 1972

*Miller, W.R. Power Mechanics McKnight Publishing Co.

Purvis, Jud. All About Small Gas Engines Goodheart-Willcox, 1963.

Saltrick, Daniel F. and Alfred M. Kubota. Aerospace Education and Model Rocketry. Box 227, Penrose, Colo.: Estes Industries.

Stine, George H. The Model Rocketry Manual. New York: Sentinel Books.

Wood, J.C. Looking at the Consumer Gage Publishing Co.

Worthington, Robert M. and others. General Power Mechanics McGraw-Hill Ryerson.

Alberta Education. A.I.D. BOOKLETS. 1973

Alberta Education. A.I.D. YEARBOOK 1974. 1974

Model Rocketry in Canada Penrose, Colo.: Estes Industries, Colo.

*Refers to primary text.

SUGGESTED APPROACHES

Power technology is a field of study designed to present to the student an introductory overview of the utilization of energy.

It is composed of four (4) modules:

a) Power Mechanics
b) Electricity
c) Electronics
d) Computers

It is intended that the Power Technology modules be taught with a maximum of "hands-on" activity, yet complemented with sufficient theory presentation to provide an optimum understanding of the subject matter.

Reference should be made to "The Multiple Activities Program" contained within this guide which will assist in determining a required hourly content.

SPECIFIC SAFETY CONCERNS

Whenever students are involved in "hands-on" activity, on-going safety instruction is of utmost importance. Safe practices should be followed at all times. Power mechanics equipment should be properly maintained and guarded. Students should be appropriately dressed.

Some safety guidelines relating specifically to the Power Technology are:

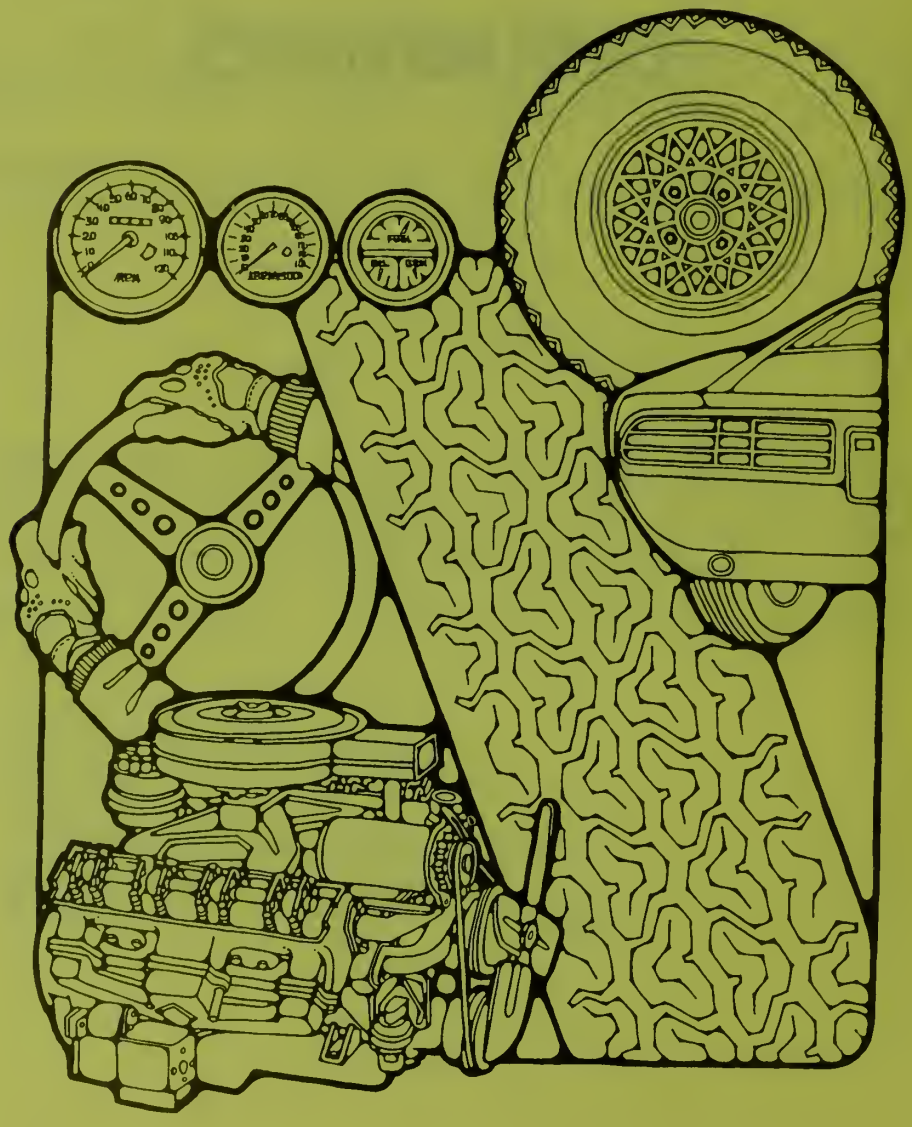
a) adequate ventilation
b) proper storage of flammables
c) adequate sensory protection
d) adequate guards in place
e) adherence to specific code requirements
f) proper electrical safeguards
g) adequate tool and equipment maintenance.

POWER MECHANICS

POWER MECHANICS

Introduction:

The Power Mechanics module will introduce the students to the internal and external combustion engine concepts. They will also discover how power can be controlled and used to do work.



TOPIC 1: SMALL ENGINES IEPSE

GENERALIZATION: In the Small Engines area the manufacture, assembly, tune-up and repair components provide many occupations in our productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Internal combustion:			
- two stroke cycle engine	Examine a two stroke cycle engine and/or model and identify the basic operating principle.		
- four stroke cycle engine	Examine a four stroke cycle engine and/or model and identify the basic operating principle.		
- rotary engine	Examine a rotary engine and/or model and identify the basic operating principle.		
- diesel engine	Examine a diesel engine (four or two stroke) and/or model and identify the basic operating principle.		
2. External combustion:			
- steam engine	Examine a steam engine and/or model and identify the basic operating principle.		
3. Disassembly	Disassemble an engine and examine: the air/fuel carburetor system, cooling system, ignition system, and lubricating system. Identify the main components of each system.		

NOTES:

TOPIC 1: SMALL ENGINES (continued) IEPSE

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
4. Assembly	Assemble an engine using proper tools and correct procedures. Follow safe procedures.		
5. Running	Examine the hazards of flammables, carbon monoxide, engine noise, and excessive revolutions per minute (RPM).		
	Start, run and stop an engine. Follow safe procedures.		
	Demonstrate proper engine storing procedure.		
	Analyze the power output of an engine, using available equipment. Follow safe procedures.		
6. Trouble shooting	Use a systematic approach to determine why an engine will not start, idle smoothly and run properly. Follow safe procedures.		
7. Tune-up	Identify engine parts which need to be replaced. Follow correct procedure to order replacement parts.		
	Examine the various sections of the operators manual and determine specifications and adjustment procedures.		
	Replace defective tune-up parts and make all the necessary adjustments. Follow safe procedures.		
	Start the engine and make final adjustments to the air/fuel mixture. Follow safe procedures.		

TOPIC 1: SMALL ENGINES (continued) IEPSE

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
8. Societal implications:			
- conservation	Explain why there is a need for conservation of fossil fuels.		
- ecology	Explain some of the effects on the ecology of the gases and wastes produced by the internal combustion engine.		
- health and safety	Explain briefly some of the hazards present when working with the internal combustion engine.		
9. Production, consumption cycle. (Should be included in one Power topic)	Explain the interrelationship of production, distribution and consumption elements of the Small Engines industry.		
10. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Mechanics industry.		
- career opportunities	Identify several occupations in the Mechanics industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Small Engines industry. (optional)		

NOTES:

TOPIC II: FLUID POWER IEPFP

GENERALIZATION: The use of fluid power, in the transmission and control of energy when doing work, provides many industrial occupations in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Forms of energy	Identify various forms of energy, such as: solar, chemical, wind and light, and illustrate several ways in which each is used.		
2. Input	Discuss how liquids or gases when placed under pressure produce a force which may be utilized to do work. Identify the method used in the lab to place the liquid or gas under pressure.		
3. Control:			
- valves	Identify the various types of valves, such as: two way, three way, four way, check and relief, used to control fluids and indicate the types of control produced. Used various control devices in a variety of practical applications. Follow safe procedures.		
4. Transmission	Identify how fluids are transmitted, e.g., flexible tubing and rigid pipes.		

NOTES:

TOPIC II: FLUID POWER (continued) IEPFP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	Identify several methods used to make connections, such as: pipe threads, flared tubing, quick connect couplings and pressure connections, which prevent fluids escaping from the system.		
5. Output:			
- fluid motors	Discuss how fluid motors operate and list several common applications.		
- cylinders	Use cylinders in a variety of applications. Follow safe procedures.		
	Discuss how fluidic systems produce mechanical power.		
6. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of fluids.		
- ecology	Explain some of the effects on the ecology of the preparation and use of fluids in industry.		
- health and safety	Explain briefly some of the hazards present when working with fluidics in industry.		

NOTES:

TOPIC II: FLUID POWER (continued) IEPFP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
7. Production, consumption cycle. (Should be included in one Power topic)	Explain the interrelationship of production, distribution and consumption elements of the Fluidics industry.		
8. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Fluidics industry.		
- career opportunities	Identify several occupations in the Fluidics industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Fluidics industry. (optional)		

NOTES:

TOPIC III: MECHANICAL POWER IEPMP

GENERALIZATION: The use of mechanical power, when converting energy to do work through the use of belts, gears, levers and other devices, produces many jobs in our productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Forms of energy	Identify various forms of energy, such as: solar, mechanical, wind and light, and illustrate several ways in which each is used.		
2. Input	Identify various forms of energy used as a source to operate mechanical equipment.		
3. Control:			
- simple/ compound machines	Identify several simple machines, such as the lever; indicate the type of control and explain how they are used to control energy.		
- gears	Identify several types of gears and indicate the type of control.		
- clutch	Identify several applications of the clutch and indicate the type of control.		
	Use various control devices in a variety of practical applications. Follow safe procedures.		
	Examine the equipment in the lab and/or home and identify the mechanical control devices used.		

NOTES:

TOPIC III: MECHANICAL POWER (continued) IEPMP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
4. Transmission	Discuss how control devices, such as gears, can be used as transmission devices. Identify various transmission devices, such as: solid shafts, cables, chains and belts. Use various transmission devices in a number of practical applications. Follow safe procedures. Examine the equipment in the lab and/or home and identify the mechanical transmission devices used.		
5. Output	Discuss how work being done, e.g., in lawn mowing, is the output of the mechanical system. Discuss how the output of a mechanical system can be changed to another form of energy, e.g., mechanical to electrical.		
6. Societal implications:			
- conservation	Explain why there is a need for conservation of mechanical energy.		
- ecology	Explain some of the effects on the ecology of the devices used to produce mechanical energy.		

NOTES:

TOPIC III: MECHANICAL POWER (continued) IEPMP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- health and safety	Explain briefly some of the hazards present when working with mechanical power.		
7. Production, consumption cycle. (Should be included in one Power topic)	Explain the interrelationship of production, distribution and consumption elements of the Mechanical Power industry.		
8. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Mechanical Power industry.		
- career opportunities	Identify several occupations in the Mechanical Power industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Mechanical Power industry. (optional)		

NOTES:

TOPIC IV: REACTION PROPULSION IEPRP

GENERALIZATION: The use of reaction propulsion, the harnessing of energy from chemical action to propel machines, has many vocational implications in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Product planning:			
- design	Discuss design principles, such as: aerodynamics, balance, stability and weight, in relation to self propelled objects.		
	Design a model rocket with an appropriate recovery system, using design information supplied by the instructor.		
	Design a carbon dioxide (CO_2) powered car, using design information supplied by the instructor.		
	Interpret simple technical drawings for a model rocket and a CO_2 car.		
- measurement	Use SI metric system measuring instruments in product development.		
	Calculate the altitude attained by student produced model rocket, in Metres.		
	Calculate the speed of the student produced CO_2 car, in kilometres per hour.		

NOTES:

TOPIC IV: REACTION PROPULSION (continued) IEPRP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- layout	Use measurement and layout tools, such as: ruler, pencil, compass, protractor and adjustable square. Follow safe procedures.		
2. Separation:			
- chip removal	Use chip removal tools, such as: bandsaw, files, drill press and chisel, in the production of a CO_2 car. Follow safe procedures.		
- non-chip removal	Use non-chip removal tools, such as: scissors, knife and snips, in the production of a model rocket. Follow safe procedures.		
3. Combining	Use combining processes, such as: epoxy glue and contact cement, in the production of a model rocket and a CO_2 car. Follow safe procedures.		
4. Testing	Perform a stability test on a model rocket. Perform a comparative roll test, off a ramp, for CO_2 cars. Perform other comparative tests on student products, such as: flight duration for rockets and power output for CO_2 cars.		
5. Energy:			
- chemical	Discuss the use of chemical energy in the production of power to propel a model rocket and/or a CO_2 car.		

NOTES:

TOPIC IV: REACTION PROPULSION (continued) IEPRP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- electrical	Discuss how electrical energy is used to ignite the fuel used to propel the model rocket. Use electrical energy to ignite the fuel when launching the model rocket. Follow safe procedures.		
- mechanical	Discuss the use of mechanical energy when starting a CO_2 car engine. Use a mechanical device to start the engine in the CO_2 car produced by the student. Follow safe procedures.		
6. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of materials used in Reaction Propulsion.		
- ecology	Explain some of the effects on the ecology of the materials used in the Reaction Propulsion industry.		
- health and safety	Explain briefly some of the hazards present when working with chemicals in the Reaction Propulsion industry or product development.		
7. Production, consumption cycle. (Should be included in one Power topic)	Explain the interrelationship of production, distribution and consumption elements of the Reaction Propulsion industry.		

NOTES:

TOPIC IV: REACTION PROPULSION (continued) IEPRP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
8. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Reaction Propulsion industry.		
- career opportunities	Identify several occupations in the Reaction Propulsion industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Reaction Propulsion industry. (optional)		

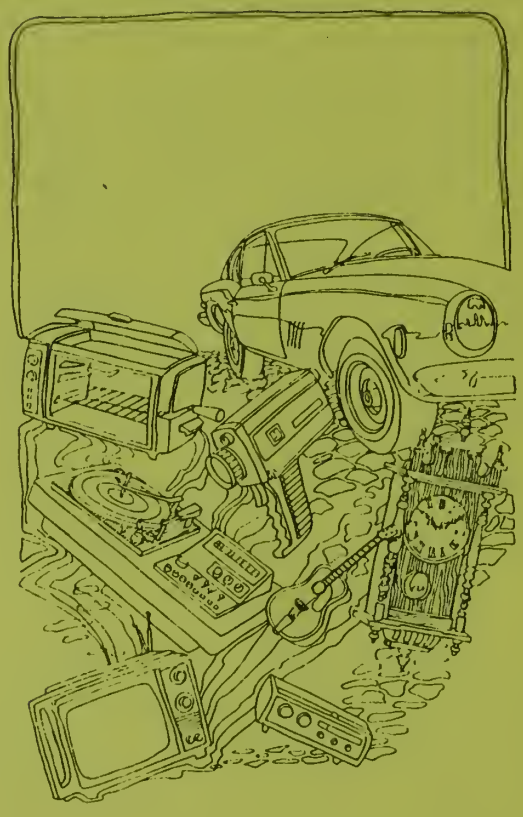
NOTES:

ELECTRICITY

ELECTRICITY

Introduction:

Electricity is basic to our industrial society. This form of energy can be converted, controlled and transmitted.



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*Refers to primary text.

TOPIC I: BASIC ELECTRICAL CIRCUITRY IEEBC

GENERALIZATION: Electricity; the movement of small particles in a closed circuit, which can be monitored and controlled by using components and measuring instruments, produces many vocational opportunities in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Electron movement	Discuss briefly the theory related to electron movement.		
2. Generating electrons:			
- mechanical	Identify and use electricity which can be produced by: friction, application of pressure on a special crystal and moving a magnet past wires or vise versa.		
- heat	Identify and use electricity produced by heating the joint of two different metals.		
- light	Identify and use a special sandwich type material to produce electrical energy.		
- chemical	Identify and use chemicals that react on different materials to produce electrical energy.		
3. Basic circuits:			
- schematics	Draw a schematic diagram of a basic circuit using appropriate symbols.		
	Identify and use the correct components, such as: source (input), switch (control), wire (transmission device), and a load (output), in a basic circuit. Follow safe procedures.		

TOPIC I: BASIC ELECTRICAL CIRCUITRY (continued) IEEBC

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
4. Types of circuits:			
- series/ parallel	Set up a series and a parallel circuit and compare amperage, voltage, and resistance. Record the results on a diagram. Follow safe procedures.		
5. Measurement:			
- polarity	Identify and determine polarity. Follow safe procedures.		
- amperage	Identify and measure amperage. Follow safe procedures.		
- voltage	Identify and measure voltage. Follow safe procedures.		
- resistance	Identify and measure resistance. Follow safe procedures.		
6. On-off switching:			
- manual	Use various types of manual on-off switches, such as: single pole single throw, double pole single throw and single pole double throw, in electrical circuits. Follow safe procedures.		
- electro-magnetic	Use an electromagnetic switch, such as the type used in a relay, in an electrical circuit. Follow safe procedures.		
- transistor	Use a transistor as a switch in a circuit. Follow safe procedures.		

NOTES:

TOPIC 1: BASIC ELECTRICAL CIRCUITRY (continued) IEEBC

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
7. Overload control:			
- fuses	Discuss the basic principle of using a fuse in a circuit. Identify and use a fuse in a circuit. Follow safe procedures.		
- circuit breaker	Discuss the basic principle of using a circuit breaker in a circuit. Identify and use a circuit breaker in a circuit. Follow safe procedures.		
8. Directional control:			
- manual switches	Discuss the function of a double pole double throw (DPDT) switch. Use the DPDT switch in an electrical circuit. Follow safe procedures.		
- diodes	Discuss the function of a diode in an electrical circuit. Use a diode in an electrical circuit to control the directional flow of electrons. Follow safe procedures.		
- silicon controlled rectifier (SCR)	Discuss the use of a combination of a diode and a transistor in an electrical circuit to produce both directional flow and on-off control of flow of electrons. Use an SCR in an electrical circuit to control the electron flow. Follow safe procedures.		

NOTES:

TOPIC I: BASIC ELECTRICAL CIRCUITRY (continued) IEEBC

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
9. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of materials used in the production of electricity.		
- ecology	Explain some of the effects on the ecology of the materials used in the production of electricity.		
- health and safety	Explain briefly some of the hazards present when working with electrical components in industry or product development.		
10. Production, consumption cycle. (Should be included in one Electricity topic)	Explain the interrelationship of production, distribution and consumption elements of the electrical components industry.		
11. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Electrical industry.		
- career opportunities	Identify several occupations in the Electrical industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Electrical industry. (optional)		

TOPIC II: MAGNETISM IEEM

GENERALIZATION: The use of electricity in producing and controlling magnetism in the industrial setting provides many vocational opportunities in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Magnetism:			
- magnetic field	Experiment with magnets and determine the characteristics of magnetic lines of force.		
- electro-magnetism	Discuss the basic principles of electro-magnetism. Identify the parts and use an electro-magnet. Follow safe procedures.		
- solenoid	Discuss the principles of operation of the solenoid and list several uses for it in the electrical field.		
- motors	Discuss the basic operating principles of a simple electric motor. Discuss the operation and use an electro-magnet in, a door chime, a door bell, a buzzer and a relay. Follow safe procedures.		
2. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of materials used in magnets.		
- ecology	Explain some of the effects on the ecology of the metals mining and manufacturing industry.		

TOPIC II: MAGNETISM (continued) IEEM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- health and safety	Explain briefly some of the hazards present when working with magnets in industry or product development.		
3. Production, consumption cycle. (Should be included in one Electricity topic)	Explain the interrelationship of production, distribution and consumption elements of the Electro-magnets industry.		
4. Occupational information:			
- high school - voltage	Identify high school programs which offer related career experiences in the Magnetics industry.		
- career opportunities	Identify several occupations in the Magnetics industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Magnetics industry. (optional)		

NOTES:

TOPIC III: UTILIZATION IEEU

GENERALIZATION: Electrical energy can be utilized to do work, when converted to other forms of energy, such as: mechanical, light, heat and chemical, thereby providing job opportunities in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Electrical energy conversion:			
- mechanical	Experiment and demonstrate with ways in which electricity is used to produce mechanical energy and list several applications of the mechanical energy produced.		
- heat	Identify and use the basic principle of converting electrical energy into heat and list several applications of the heat energy produced.		
- light	Identify and use the basic principles of converting electrical energy into light.		
- chemical	Identify and use the basic principle used for electroplating and/or electrolysis of water.		
- sound	Identify and use the basic principles of the operation of a telephone circuit. Identify and use the basic principles of the operation of a telegraph circuit.		
2. Safety	List some of the safety procedures to be observed while servicing electrical appliances.		

TOPIC III: UTILIZATION (continued) IEEU

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	Inspect the lab and home for any unsafe electrical conditions with regards to power appliances and the wiring.		
3. Trouble shooting	Perform several "Trouble-shooting" exercises used to detect defects in appliances.		
	Identify the repairs necessary to correct the malfunctioning appliances.		
4. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of electrical parts.		
- ecology	Explain some of the effects on the ecology of the materials from electrical appliances.		
- health and safety	Explain briefly some of the hazards present when working with Electrical appliances in industry or product development.		
5. Production, consumption cycle. (Should be included in one Electricity topic)	Explain the interrelationship of production, distribution and consumption elements of the Electrical Appliance industry.		
6. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Electrical Appliance industry.		

NOTES:

TOPIC III: UTILIZATION (continued) IEEU

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- career opportunities	Identify several occupations in the Electrical Appliance industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Electrical Appliance industry. (optional)		

NOTES:

ELECTRONICS

ELECTRONICS

Introduction:

In a productive society one of the most precise and rapidly changing areas is the electronics industry. Components having unique physical and electrical characteristics can be assembled and connected in the production of electronic equipment. Radios, stereos, navigational equipment, monitoring devices and computers are just a few of the common items produced in the industry.

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TOPIC IV: ELECTRONICS IEEE

GENERALIZATION: Electronics, the utilization of electrical components such as: resistors, transistors, capacitors and diodes, assembled in a way to generate signals in communications, is an industry which provides many job opportunities in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Components:			
- operation	Identify and use components, such as: resistors, capacitors, transistors, diodes and SCR's and discuss their basic operation. Follow safe procedures.		
- color coding	Review the coding used for resistors, capacitors and other components. Refer to chassis wiring color code and examine the chassis wiring of a radio and/or television. Follow safe procedures. Identify and use color coding by completing several exercises.		
2. Oscillator circuit	Connect various circuits on prepared kits to produce various sounds, such as: an electronic bird, organ, and sound effect generator. Follow safe procedures. Draw block diagrams and/or schematic diagrams of the circuits connected. Make from components a product which makes an electronic sound. Follow safe procedures.		

TOPIC IV: ELECTRONICS (continued) IEEE

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
3. Regulations	Review the regulations concerning the operation of transmission devices, such as: walkie-talkies, citizen band radios and ham radios. List the regulations governing the wireless transmission devices in the lab.		
4. Communications:			
- transmission	Use a tape recorder at low speed to record a short message. Play it back at high speed to illustrate how the telephone system is used for high speed data transmission. Follow safe procedures. Discuss the types of radio, such as: A.M., F.M. and Shortwave. Use a walkie-talkie and/or a citizen band radio to transmit messages, following all the regulations governing the operation of the equipment. AND/OR Connect various wireless transmission circuits found in prepared electronic experimental kits.		
- history	List some of the major developments in the history of the radio.		
5. Radio systems:			
- detector	Identify and use the detector to demodulate radio waves. Follow safe procedures.		

NOTES:

TOPIC IV: ELECTRONICS (continued) IEEE

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- tuner	Identify and use the tuner to separate signals from different radio stations. Follow safe procedures.		
- filter	Identify and use several components to remove unwanted noise. Follow safe procedures.		
- amplification	Identify and amplify weak signals to increased strength so that the sound can be heard through speakers. Follow safe procedures.		
	Connect a radio system and draw a block diagram of the system. Follow safe procedures.		
6. Sound systems:			
- history	Discuss some of the major developments in the history of the phonograph.		
- production	Discuss the piezoelectric effect as it is used in the phonograph.		
- amplification	Discuss how the signal is amplified to produce a louder sound.		
	Operate a phonograph system and control loudness and tone.		
	Draw a block diagram of the phonograph system.		
	Examine different types of records under a microscope and relate the differences in terms of types of phonographs.		

NOTES:

TOPIC IV: ELECTRONICS (continued) IEEE

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	Perform several experiments to help clarify the various concepts, relative to sound systems, using available equipment. Follow safe procedures.		
7. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of electronic components.		
- ecology	Explain some of the effects on the ecology of the Electronic manufacturing industry.		
- health and safety	Explain briefly some of the hazards present when working with Electronic equipment in industry or product development.		
8. Production, consumption cycle.	Explain the interrelationship of production, distribution and consumption elements of the Electronics industry.		
9. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Electronics industry.		
- career opportunities	Identify several occupations in the Electronics industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Electronics industry. (optional)		

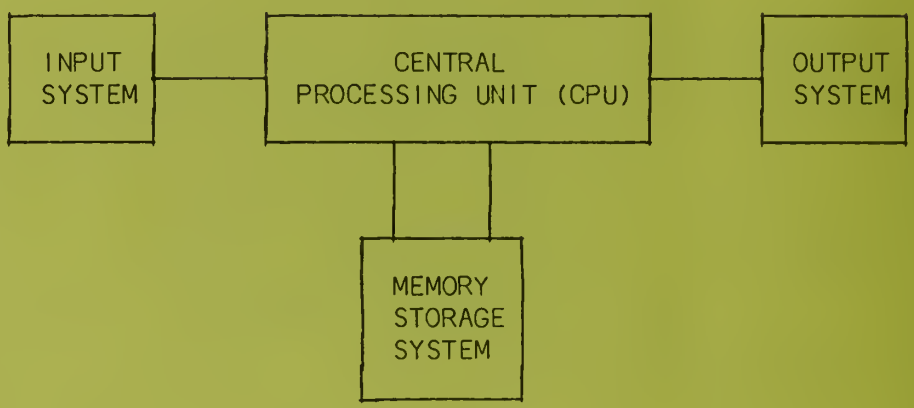
NOTES:

COMPUTER

COMPUTER

Introduction:

A tool that is finding its way into modern technology is the computer. An individual in our modern world will need at least a rudimentary grasp of computer literacy to function efficiently.



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TOPIC V: COMPUTERS IEEC

GENERALIZATION: The computer is a technological device which can be programmed to perform operations quickly and accurately thus having implications in a productive society for vocational choices.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Computer growth:			
- history	Describe the development of analog and digital computers.		
- present	Discuss current computer systems.		
- future	Make some projections concerning the use of the computer in our society during the next decade.		
2. Computer systems:			
- input	Identify and use several input devices, such as: keyboard, punched cards, light pen or paper tape, to enter information in the computer. Follow safe procedures.		
- output	Check the output device, such as: printer, graph plotter, video display unit (VDU), for the results after processing the information.		
3. Central Processing Unit (CPU):			
- core memory	Describe how the core memory stores information during program execution.		
- control unit	Discuss how the operations on the computer are sequenced by the control unit.		

TOPIC V: COMPUTERS (continued) IEEC

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- arithmetic/ logic unit	Discuss how digital computers use the binary (base 2) system to make 'decisions'.		
- storage units	Identify and use storage systems, such as: magnetic tape or disc, to keep information. Follow safe procedures.		
4. Programming:			
- language	Review several computer languages, such as: Fortran, Cobol, Pascal and Basic.		
- flow charts	Prepare a flow chart for a simple operation, such as: filling a glass of water, and use the correct symbols.		
- programs	Write a simple program and use it on the computer.		
5. Prepared programs:			
- graphics	Run a computer graphics program and use it to manipulate information.		
- simulation	Use several computer simulations and discuss the advantages of using them to learn complicated skills.		
- machine control	Discuss some of the industrial applications of the computer for controlling machines; such as: lathes, milling machines and drill presses.		

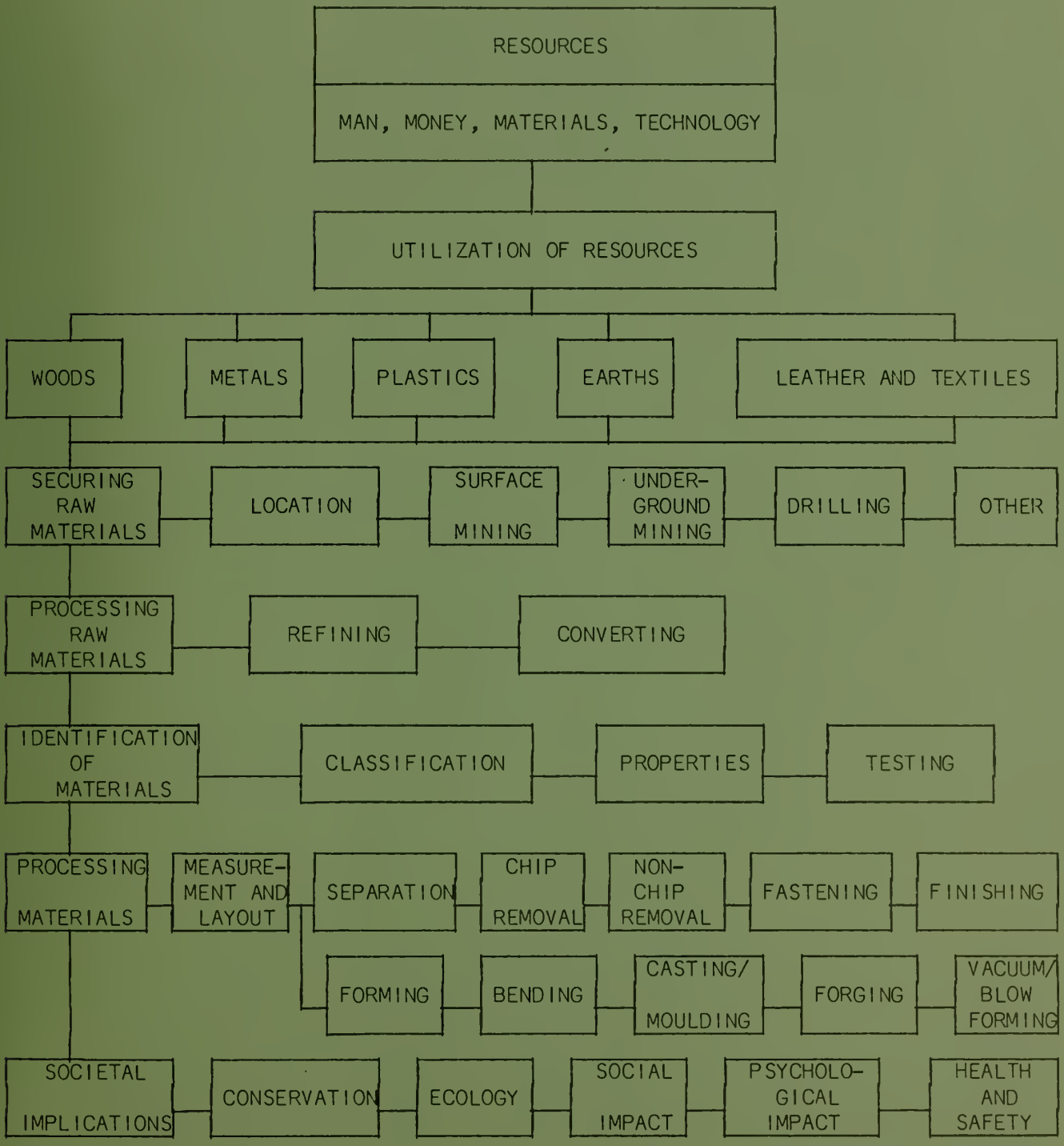
NOTES:

TOPIC V: COMPUTERS (continued) IEEC

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
6. Societal implications:			
- conservation	Explain why there is a need for conservation and recyling of Computer materials.		
- ecology	Explain some of the effects on the ecology of the Computer industry.		
- health and safety	Explain briefly some of the hazards present when working with Computers in industry or product development.		
7. Production, consumption cycle.	Explain the interrelationship of production, distribution and consumption elements of the Computers industry.		
8. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Computers industry.		
- career opportunities	Identify several occupations in the Computers industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Computers industry. (optional)		

NOTES:

FIELD OF STUDY: MATERIALS TECHNOLOGY



MATERIALS TECHNOLOGY

Introduction:

The materials technology area is a very large component of our highly industrialized society. The student should become aware of the various materials used through involvement with materials testing and fabrication. This field should bring the student into contact with the more common materials, tools, equipment and processes as used by industry. Through this exposure it is hoped that the students will better understand the world in which they find themselves. A study of occupations related to materials modules will reveal the wide scope of this field. There are careers in this field which have not yet been defined but which are certain to evolve in the near future.

OBJECTIVES FOR MATERIALS TECHNOLOGY

1. To provide the student with an opportunity to discover special aptitudes in the materials area.

2. To provide the student with an opportunity to learn to use tools and machines safely.

3. To foster in the student an appreciation of high standards of workmanship and of the dignity of work.

4. To give the student an insight into the career opportunities in various career fields.

5. To familiarize the student with the fundamental material processes used in industry through the use of safe fabrication procedures.

6. To demonstrate the interrelationship of the various materials technologies.

SUGGESTED APPROACH

Materials technology is a field of study designed to present to the student an introductory overview of various materials and related industries.

It is composed of five (5) modules.

a) Woods
b) Metals
c) Plastics
d) Earths
e) Leather and Textiles

SPECIFIC SAFETY CONCERNS

Whenever students are involved in "hands-on" activity, on-going safety instruction is of utmost importance. Safe practices should be followed at all times. Equipment and machines should be properly guarded and maintained. Students should be appropriately dressed.

Some safety guidelines relating specifically to the Materials Technology topics are:

a) adequately ventilation of toxic fumes
b) approved chemical/solvent storage facilities
c) appropriate waste disposal facilities
d) properly maintained first aid kit
e) magnetically switched power control for machines
f) non-skid flooring around the machines
g) properly grounded electrical equipment
h) other protective equipment:
   - clothing
   - gloves
   - eye protection
i) adequate supply and appropriate fire extinguishing equipment
j) use of food safe glazes in ceramics
k) appropriate handles on all files.

WOODS

WOODS

Introduction:

Wood is probably one of the most common and important materials used in industry. This module will provide the opportunity for the student to become in contact with common woods, wood products and tools and equipment used in industrial processes. Through the fabrication of products the students should gain a better understanding of the industrial world.

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*Refers to primary text.

TOPIC I: WOODS IEMW

GENERALIZATION: Woods Technology involves procuring, planning, processing, and finishing which have vocational implications in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Location	Identify the provinces that are major producers of forest products as raw materials.		
2. Logging	Describe the logging industry.		
3. Processing:			
- lumber	Describe how logs are converted to standard sizes of lumber. List the common dimensional sizes of lumber.		
- plywood	Describe how plywood is manufactured.		
- pulp and paper	Discuss the manufacture of paper from wood pulp. Discuss the role of pulp and paper in the Canadian economy.		
4. Identification:			
- classification	Explain the differences in hardwood and softwood.		
- properties	Identify the basic properties of the woods used in the lab for product development.		
- testing	Perform simple tests on woods to determine hardness, weight, strength and grain size. Follow safe procedures.		

NOTES:

TOPIC 1: WOODS (continued) IEMW

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
5. Product planning:			
- design	Demonstrate an understanding of basic design principles such as: function, form, balance, proportion and contrast. Interpret simple technical drawings.		
- measurement	Use SI metric system measuring instruments in product development.		
- layout	Use measurement and layout tools such as: ruler, scriber, compass, protractor, sliding T-bevel, marking gauge, adjustable square and combination set. Follow safe procedures.		
6. Separation:			
- chip removal	Describe the basic principal used by chip removal tools. Use chip removal tools, such as: chisels, handsaws and files, in product development.		
- non-chip removal	Describe the basic principle used by non-chip removal tools and equipment. Discuss the effect of several basic principles, such as: speed, effort, and sharpness, as related to separating materials. Identify and use the following separating equipment: bandsaw, scroll saw, belt/disc sander, lathe and drill press. Follow safe procedures.		

NOTES:

TOPIC 1: WOODS (continued) IEMW

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
7. Forming:			
- bending	Describe the basic procedure for bending and laminating wood. Make a laminated wood product. Follow safe procedures.		
- casting/ moulding	Describe how particle board is cast or moulded from particles of wood.		
8. Conditioning:			
- moisture	Use steam to condition wood for bending, if equipment available. Follow safe procedures.		
9. Combining:			
- adhesion	Identify and use adhesives, such as: contact cement, resin glue and epoxy glue, to bond materials in product development.		
- coating	Use coating processes, such as: paint, varnish, stains and lacquer, to protect and enhance the surface of products. Follow safe procedures.		
- mechanical fasteners	Identify and use mechanical fastening devices, such as: nails, screws and bolts, in product development.		
10. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of lumber.		

NOTES:

TOPIC I: WOODS (continued) IEMW

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- ecology	Explain some of the effects on the ecology of the lumbering industry.		
- health and safety	Explain briefly some of the hazards present when working with wood in industry or product development.		
11. Production, consumption cycle. (Should be included in one Materials topic)	Explain the interrelationship of production, distribution and consumption elements of the Woods industry.		
12. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Woods industry.		
- career opportunities	Identify several occupations in the Woods industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Woods industry. (optional)		

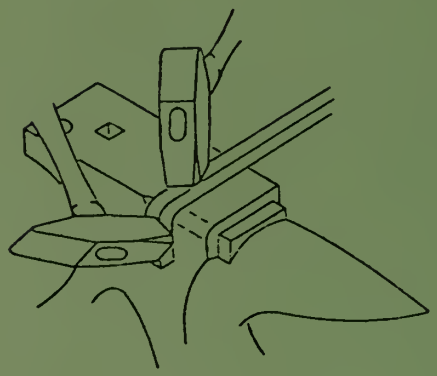
NOTES:

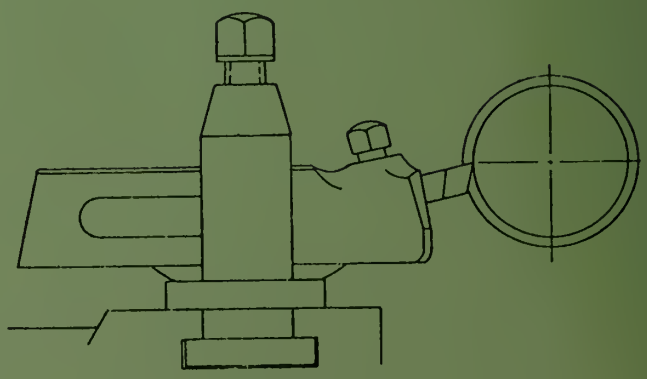
METALS

METALS

Introduction:

Metals play an important role in our productive society. The metals area will provide the student with an understanding and appreciation of the use of metal in product development and industry.





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TOPIC II: METALS IEMM

GENERALIZATION: Metals Technology deals with extracting, refining, alloying, testing, planning, processing and finishing operations which have vocational implications in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Location	List the raw materials for some of the commonly used metals and identify on a map several areas in Canada where they are located.		
2. Extraction	Explain briefly how the main raw materials are extracted by surface or underground mining.		
3. Refining	Describe briefly the main process used in the production of iron.		
4. Alloying	Describe what is meant by alloying and list several reasons why alloys are made.		
5. Identification:			
- properties	List the basic properties of metals such as: iron, steel, aluminium, copper, and brass. Identify the basic uses, similarities and differences between: sheet metal, hot metal, bench metal, machine metal, and art metal.		
- testing	Perform simple tests on various metals to determine carbon content, hardness, ductility and machinability. Follow safe procedures.		

NOTES:

TOPIC II: METALS (continued) IEMM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
6. Product planning:			
- design	Demonstrate an understanding of basic design principles such as: function, form, balance, proportion and contrast. Interpret simple technical drawings.		
- measurement	Use SI metric system measuring instruments in product development.		
- layout	Use measurement and layout tools such as: ruler, scriber, compass, protractor, centre punch, adjustable square and combination set. Follow safe procedures.		
7. Separation:			
- chip removal	Compare the operation of hand and machine chip removal separation tools in terms of speed, effort and safety. Use chip removal tools such as: handsaws and files in product development.		
- non-chip removal	Discuss the basic principles used in non-chip removal tools and equipment. Identify the tools and equipment such as: shears, snips and hole punches. Discuss separation processes which use heat and chemical action.		

NOTES:

TOPIC II: METALS (continued) IEMM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	Identify and use the following separating tools and equipment: lathe, milling machine, grinder, drill press, power hacksaw, shear, notcher and other available machine and hand tools, in product development. Follow safe procedures.		
8. Forming:			
- bending	Bend hot and/or cold metal using: brake, rollers, bender, and other available equipment. Follow safe procedures.		
- forging	Identify and use the forging tools and equipment in product development. Follow safe procedures.		
- casting/ moulding	Identify and use the casting tools and equipment available, such as: sand casting, investment casting or open mould casting in product development. Follow safe procedures.		
- embossing/ mounding	Identify and use the embossing/ mounding tools and equipment available, in product development. Follow safe procedures.		
- spinning	Identify and use the spinning equipment available, in project development. Follow safe procedures.		

NOTES:

TOPIC II: METALS (continued) IEMM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
9. Conditioning:			
- heat	Identify and use heat for annealing, hardening and tempering metals used in product development. Follow safe procedures.		
10. Combining:			
- adhesion	Identify and use soldering equipment available, in product development. Follow safe procedures. Explain briefly the principle of brazing. List adhesives used when bonding metals, e.g., epoxy and contact cements.		
- cohesion	Explain briefly how welding is used as a cohesive combination process. Explain the safe operation of the welder. Use the spot welder to perform cohesion tasks in product development. Follow safe procedures.		
- coating	Identify and use coating materials, such as paint, plastics and lacquer, to protect and enhance the finished surface of products. Follow safe procedures.		
- mechanical	Identify and use equipment available, such as: rivets, bolts and screws, to fasten metals in product development. Follow safe procedures.		

NOTES:

TOPIC II: METALS (continued) IEMM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
11. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of metals.		
- ecology	Explain some of the effects on the ecology of the metals mining and manufacturing industry.		
- health and safety	Explain briefly some of the hazards present when working with metals in industry or product development.		
12. Production, consumption cycle. (Should be included in one Materials topic)	Explain the interrelationship of production, distribution and consumption elements of the Metals industry.		
13. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Metals industry.		
- career opportunities	Identify several occupations in the Metals industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Metals industry. (optional)		

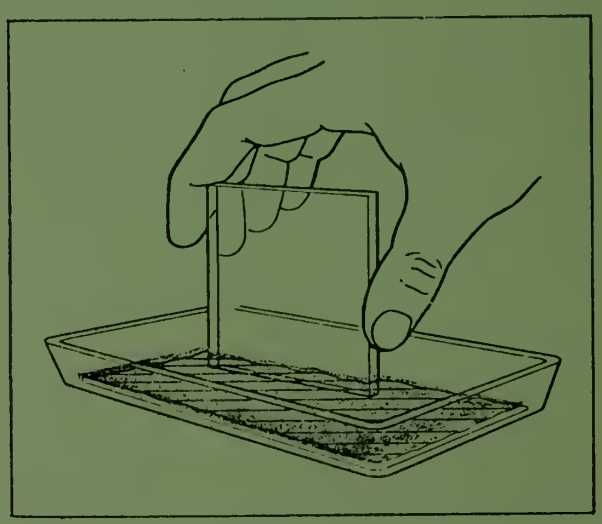
NOTES:

PLASTICS

PLASTICS

Introduction:

Plastics is rapidly becoming an important material in industry. It is currently replacing several wood and metal products used in the home. The plastics module is designed to introduce the student to the various types of plastics and the processes used to improve the usefulness of the material. Through careful selection of products produced in the laboratories, the student will be exposed to as many of the tools and machines as possible in order that they may experience the industrial processes first hand.



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TOPIC III: PLASTICS IEMP

GENERALIZATION: Plastics Technology deals with the derivation of raw materials and the manufacture of synthetics which are used in a variety of products providing many occupations in related fields.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Location	List the raw materials for plastics and identify on a map several areas in Canada where they are located.		
2. Extraction	Explain briefly how natural gas is extracted by drilling.		
3. Refining	Describe briefly the basic principles involved in the production of plastics.		
4. Identification:			
- properties	Study a list of general properties of the various plastics.		
- testing	Perform several simple comparative tests to determine tensile strength, hardness, and solubility of various plastics. Follow safe procedures.		
5. Product planning:			
- design	Demonstrate an understanding of basic design principles such as: function, form, balance, proportion, and contrast. Interpret simple technical drawings.		

NOTES:

TOPIC III: PLASTICS (continued) IEMP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- measurement	Use SI metric system measuring instruments in product development.		
- layout	Use measurement and layout tools such as: ruler, scriber, compass, protractor, adjustable square and combination set. Follow safe procedures.		
6. Separation:			
- chip removal	Identify and use chip removal separating tools and equipment such as: hacksaw, file, bandsaw, sander and buffer in product development. Follow safe procedures.		
- non-chip removal	Identify and use non-chip removal separating tools available, such as: shear, snips, and hot wire, in product development. Follow safe procedures.		
	Classify the separating tools and equipment used according to the process of: sawing, drilling, turning, milling, abrading and shearing.		
7. Forming:			
- bending	Identify and use available equipment, such as: jigs, and moulds to bend thermoforming plastics. Follow safe procedures.		
- vacuum/blow forming	Describe the principles of vacuum and blow forming. Use the vacuum/blow former in product development. Follow safe procedures.		

TOPIC III: PLASTICS (continued) IEMP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- casting/ moulding	Identify the various casting and/or moulding procedures in the plastics area and list several products that can be made with each procedure. Use the casting and/or moulding equipment available, such as injection moulding, rotation moulding and dip moulding, in product development. Follow safe procedures.		
8. Conditioning:			
- heat	Explain the effects of heat on thermoset and thermoform plastics.		
9. Combining:			
- adhesion	Identify and use adhesives such as: epoxy, contact cement and silicone, in product development. Follow safe procedures.		
- cohesion	Identify and use available bonding equipment and materials such as: hot air welding, heat sealing and solvent cement, in product development. Follow safe procedures.		
- coating	Identify and use coating materials, such as paint and lacquer, to protect and enhance the finished surface of products. Follow safe procedures.		
- mechanical	Identify and use the mechanical fastening devices available, such as: screws and bolts, in product development. Follow safe procedures.		

TOPIC III: PLASTICS (continued) IEMP

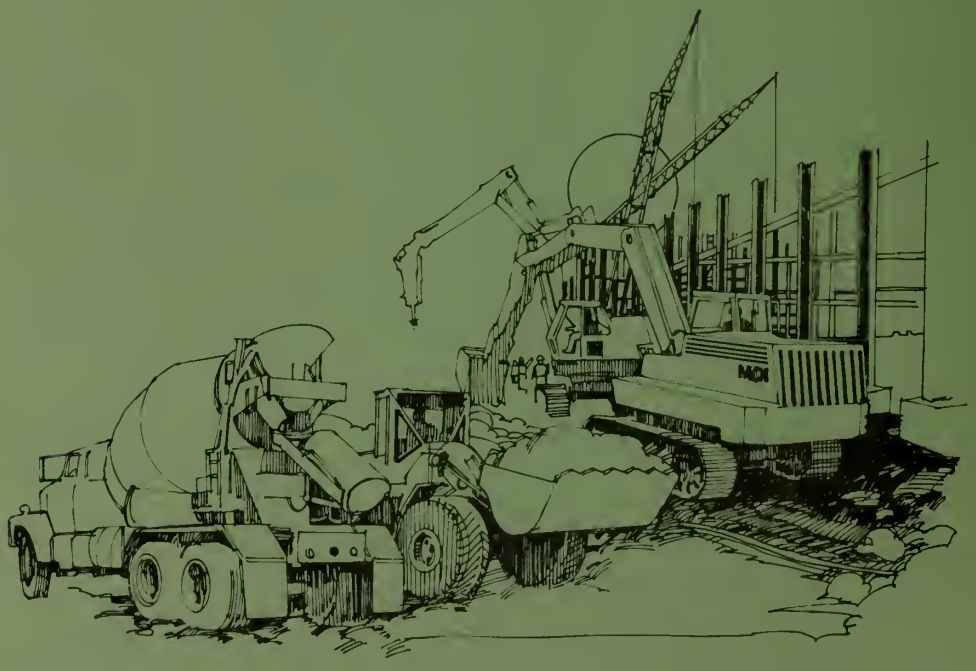
CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- mixing	Identify and discuss plastics materials which are mixed, such as: polyester resin, in project development. Follow safe procedures.		
10. Societal implications:			
- conservation	Explain why there is a need for conservation of natural gas and coal.		
- ecology	Explain some of the effects on the ecology of the Plastics industry.		
- health and safety	Explain briefly some of the hazards present when working with plastics in industry or product development.		
11. Production, consumption cycle. (Should be included in one Materials topic)	Explain the interrelationship of production, distribution and consumption elements of the Plastics industry.		
12. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Plastics industry.		
- career opportunities	Identify several occupations in the Plastics industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Plastics industry. (optional)		

EARTHS

EARTHS

Introduction:

The area of earths technology incorporates several materials which have been converted into the form of concrete, clay, plaster and abrasives. The student should become familiar with these materials through practical work. Emphasis should not be placed upon the art/craft approach, but on industrial concepts and good design principles. It should be noted that ceramics or concrete, or a combination of both, may be offered as a vehicle for instruction in this area.



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TOPIC IV: EARTHS IEME

GENERALIZATION: Earths Technology provides many occupations in the extraction, processing, combining, conditioning and finishing components of the industry.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Location	List the raw materials for cement, concrete and ceramic materials and be able to locate on a map of Alberta some of the locations where the materials are extracted.		
2. Extraction	Explain how the raw materials are extracted by surface or underground mining.		
3. Refining	Identify the main processes in refining and converting the raw materials, such as: crushing, grinding and sizing.		
4. Converting	Explain how shale or clay and limestone are changed to cement. Explain how concrete is made from sand, gravel or crushed stone mixed with cement and water.		
5. Identification:			
- properties	List some of the mechanical properties of the materials used in product development, such as: compressive strength, tensile strength, hardness, impact strength, plasticity and flexural (bending) strength.		

NOTES:

TOPIC IV: EARTHS (continued) IEME

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- testing	Perform a simple test, on the materials used to determine one of the following: hardness, tensile strength or impact strength. Follow safe procedures.		
6. Product planning:			
- design	Demonstrate an understanding of basic design principles, such as: function, form, balance, proportion and contrast. Interpret simple technical drawings.		
- measurement	Use SI metric system measuring instruments in product development.		
- layout	Use measurement and layout tools, such as: ruler, calipers and trisquare.		
7. Preparing materials	Prepare clay for pinch forming, pie forming, slab forming, jiggering, and slip casting. Prepare a batch of concrete and slump test it, comparing the results with pre-determined values.		
8. Separation:			
- chip removal	Identify and use chip removal separating tools and equipment, such as: knife, modeling tools, etc. Follow safe procedures.		

NOTES:

TOPIC IV: EARTHS (continued) IEME

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- non-chip removal	Identify and use non-chip removal separating tools and equipment, such as: spatula and wire. Follow safe procedures. Identify and use the process of jiggering in product development.		
9. Forming:			
- bending	Bend the material available in the earths area to press form a product. Follow safe procedures.		
- casting/ moulding	Cast an article using slip casting method. Follow safe procedures. Extrude clay through an available device to demonstrate a knowledge of the extruding process. Follow safe procedures. Pour a block of concrete in a prepared form, e.g. patio block. Follow safe procedures.		
10. Conditioning:			
- heat	Prepare and use the kiln to fire ceramic products. Follow safe procedures.		
- moisture	Use water for conditioning ceramic clay and concrete for product development. Follow safe procedures.		
11. Combining:			
- adhesion	Identify and use the proper adhesive, e.g., epoxy resin, for the type of materials to be bonded together. Follow safe procedures.		

NOTES:

TOPIC IV: EARTHS (continued) 1EME

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- cohesion	Identify and use the correct adhesive, e.g., cement in concrete, for the type of materials to be bonded together. Follow safe procedures.		
- finishing	Identify and use different glazes, embossing, and graffito, to finish and decorate ceramic products. Follow safe procedures. Use tools available to produce textures and patterns on ceramic and concrete.		
- mechanical fasteners	Identify and use some of the mechanical fasteners available for use in concrete, such as: concrete nails, or lag bolts and plugs. Follow safe procedures.		
12. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling materials used in the Earths industry.		
- ecology	Explain some of the damaging effects on the ecology caused by mining the raw materials for ceramics, cement and concrete.		
- health and safety	Explain briefly some of the hazards present when working with ceramics, cement and concrete.		

NOTES:

TOPIC IV: EARTHS (continued) IEME

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
13. Production, consumption cycle. (Should be included in one Materials topic)	Explain the interrelationship of production, distribution and consumption elements of the Earths Technology industry.		
14. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Earths Technology industry.		
- career opportunities	Identify several occupations in the Earths Technology industry and research the educational requirements for entry to these careers. Participate in field trips to plants involved in activities related to the Earths Technology industry. (optional)		

NOTES:

LEATHER-TEXTILES

LEATHER-TEXTILES

Introduction:

Leather and textiles, both natural and synthetic, play a very important part in our daily living. Through the application of the concepts to product fabrication, the student will become more aware of the leather and textile industries. Care should be taken to emphasize the industrial concepts of the area rather than the art/crafts approach.

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TOPIC V: LEATHER AND TEXTILES IEMLT

GENERALIZATION: The Leather and Textile industry has components, such as: procuring and preparing the raw materials, conditioning, forming and combining processes in product development, which provide occupational choices in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Location	List the raw materials for leather and textiles and identify on a map several areas in Canada where they are located.		
2. Extraction	Explain briefly how leather and textiles are produced from raw materials.		
3. Converting	Describe briefly the process of vegetable tanning leather. Describe briefly how textiles are processed, such as: plaiting, knotting, hooking and weaving.		
4. Identification:			
- properties	List some properties of the materials used in product development.		
- testing	Perform simple tests to determine tensile strength, elasticity and resistance to stain. Follow safe procedures.		
5. Product planning:			
- design	Demonstrate an understanding of basic design principles such as: function, form, balance, proportion and contrast. Interpret simple technical drawings.		

TOPIC V: LEATHER AND TEXTILES (continued) IEMLT

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- measurement	Use SI metric system measuring instruments in product development.		
- layout	Use measurement and layout tools, such as: ruler, metal square, scriber, and spacing wheel.		
6. Separation:			
- non-chip removal	Identify and use non-chip removal tools, such as: scissors, shears, gouges, knives and chisels, in product development. Follow safe procedures.		
7. Conditioning:			
- moisture	Use the correct amount of moisture when preparing leather for carving and stamping.		
- slashing	Treat textile material with hot solution of starch, wax, oil and water before slashing. Follow safe procedures.		
8. Forming:			
- carving	Identify and use carving tools, such as: swivel knife and gouges, to surface decorate leather in product development. Follow safe procedures.		
- stamping	Identify and use stamping tools, such as: mallet and saddle stamps, to surface decorate leather in product development. Follow safe procedures.		
- moulding	Stretch mould material over a die in product development. Follow safe procedures.		

TOPIC V: LEATHER AND TEXTILES (continued) IEMLT

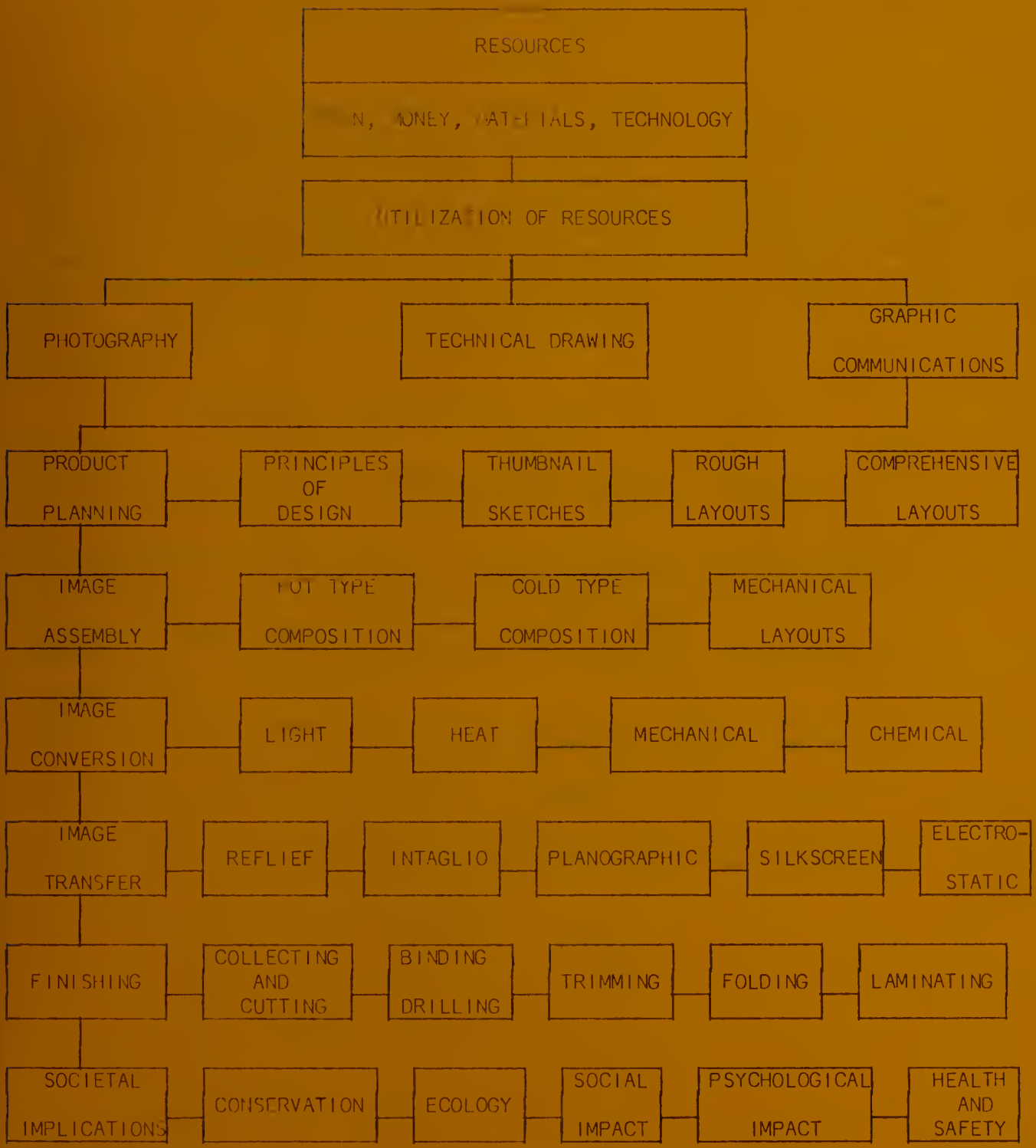
CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
9. Combining:			
- adhesion	Identify and use adhesive, such as: contact cement, in product development. Follow safe procedures.		
- coating	Use paints and dyes on leather and textiles. Follow safe procedures.		
- mechanical fasteners	Identify and use snap fasteners in product development. Follow safe procedures.		
- stitching	Identify and use at least one stitch, such as: single and double whip-stitch, single cordovan and running stitch, in product development. Follow safe procedures.		
10. Societal implications:			
- conservation	Explain why there is a need for conservation of leather or textiles.		
- ecology	Explain some of the effects on the ecology caused by harvesting the raw materials for leather or textiles.		
- health and safety	Explain briefly some of the hazards present when working with leather and textiles in industry.		
11. Production, consumption cycle. (Should be included in one Materials topic)	Explain the interrelationship of production, distribution and consumption elements of the Leather or Textile industry.		

TOPIC V: LEATHER AND TEXTILES (continued) IEMLT

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
12. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Leather or Textile industry.		
- career opportunities	Identify several occupations in the Leather or Textile industry and research the educational requirements for entry to these careers.		
	Participate in field trips to plants engaged in activities related to Leather or Textile industry. (optional)		

NOTES:

FIELD OF STUDY: GRAPHIC COMMUNICATIONS



GRAPHIC COMMUNICATIONS TECHNOLOGY

Introduction:

For thousands of years people have been preserving their thoughts in pictures and words, but today, newspapers, magazines and books provide this kind of communication. Since printing and publishing materials is a leading industry in Canada, the importance of graphics today cannot be over-emphasized. Whatever segment of our society we examine--the planning of our homes, the automation and computerization of our industries, the satellite, the beckoning of whatever deeper knowledge may lead outside the circumference of our own planet as we venture out into space--all require some form of graphics in their production.

OBJECTIVES FOR GRAPHIC COMMUNICATIONS TECHNOLOGY

1. To develop in the student an appreciation of the importance of graphics in all aspects of a productive society.

2. To develop an appreciation for the many applications to light sensitive materials in a productive society.

3. To impress upon the student, through practical experiences, the importance of technical design and illustration in a complex technological society.

4. To develop a basic understanding of the processes and their interdependence in the various areas of graphics.

5. To develop positive attitudes toward safety and the dignity of work.

6. To assist the student to explore the graphics area and identify interests or abilities in the related career fields.

SUGGESTED APPROACHES

Graphic Communications Technology is a field of study designed to present to the student an introductory overview of the graphics industry.

It is composed of three (3) modules:

a) printing
b) photography
c) technical drawing

It is intended that the Graphic Communications Technology modules be taught with a maximum of "hands-on" activity yet complemented with sufficient theory presentation to provide an optimum understanding of the subject matter.

Reference should be made to "The Multiple Activities Program" contained within this guide which will assist in determining a required hourly content.

SPECIFIC SAFETY CONCERNS

Whenever students are involved in "hands-on" activity, on-going safety instruction is of utmost importance. Safety practices should be followed at all times. Graphic Communications equipment should be properly guarded and maintained. Students should be appropriately dressed.

Some safety guidelines relating specifically to the Graphic Communications Technology topics are:

a) properly shielded exposure units
b) adequate ventilation of toxic fumes
c) approved chemical/solvent storage facilities
d) appropriate waste disposal facilities
e) properly maintained first aid kit
f) electrical power safety switches
g) fire extinguishing equipment
h) non-skid floor material in press areas
i) properly grounded electrical equipment
j) other protective equipment,
   i.e. clothing
   gloves
   eye protection.

PRINTING

PRINTING

Introduction:

This module is related primarily to the printing industry. Since the industry is large in terms of economics and the impact it has on people, a basic understanding of it should lead the students to a better understanding of the world in which they live.

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*Refers to primary text.

TOPIC I: LITHOGRAPHY IEGP

GENERALIZATION: The use of copying techniques in preparing offset duplicating masters have expanded vocational choices in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Product planning:			
- design	Identify the basic design principles, such as: function, balance, form, proportion, color, contrast and rhythm. Produce simple thumbnail sketches, rough and comprehensive layouts for product development.		
- measurement	Use the printer's point system of measurement in product development.		
2. Image assembly:			
- hot and/or cold type	Prepare exact form of words, symbols or pictures using the available composition materials and equipment. Follow safe procedures.		
3. Image conversion:			
- direct image	Prepare a direct image master of the image assembled. Follow safe procedures.		

NOTES:

TOPIC 1: LITHOGRAPHY (continued) IEGP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
4. Image transfer:			
- offset	Describe the principle of offset lithography. Use the offset process to reproduce sheets with attention to master mounting, ink and moisture control and paper feed control. Follow safe procedures. Clean the offset press. Follow safe procedures.		
5. Finishing:			
- binding	Describe some of the common methods for preparing and binding paper. Bind a product using one of the common processes. Follow safe procedures.		
- embossing	Describe the embossing process used for book covers.		
- laminating	Describe and use the laminating process to cover a document. Follow safe procedures.		
- trimming	Use the paper cutter or corner rounder to trim and enhance products. Follow safe procedures.		
- folding	Describe and use some of the common paper folds, such as: single fold, parallel letter fold, accordion fold, panel fold, french fold and booklet fold, in product development. Follow safe procedures.		

NOTES:

TOPIC I: LITHOGRAPHY (continued) IEGP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- collating	Use a method of collating to gather sheets of paper together in product development.		
- drilling and/ or punching	Discuss the use of a paper drill in preparing sheets for binding. Use the hole punching equipment to prepare sheets for binding in product development. Follow safe procedures.		
7. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of paper.		
- ecology	Explain some of the effects of the paper manufacturing industry.		
- health and safety	Explain briefly some of the hazards present when working with presses in industry or product development.		
8. Production, consumption cycle. (Should be included in one Graphic Communications topic)	Explain the interrelationship of production, distribution and consumption elements of the Printing industry.		

NOTES:

TOPIC I: LITHOGRAPHY (continued) IEGP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
9. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Lithographic printing industry.		
- career opportunities	Identify several occupations in the Lithographic printing industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Lithographic printing industry. (optional)		

NOTES:

TOPIC II: PHOTO MECHANICAL REPRODUCTION IEGPM

GENERALIZATION: Working in the Photo Mechanical area of printing prepared messages has implications for vocational choices in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Product planning:			
- design	Identify the basic design principles, such as: function, balance, form, proportion, color, contrast and rhythm. Produce simple thumbnail sketches, rough and comprehensive layouts for product development.		
- measurement	Use the printer's point system of measurement in product development.		
2. Image assembly:			
- hot and/or cold type	Prepare exact form of words, symbols or pictures using the available composition materials and equipment. Follow safe procedures.		
3. Image conversion:			
- photographic	Discuss the photographic method of preparing a paper or metal master for the offset process.		
- electrostatic	Use the prepared form on an electrostatic plate maker and etch the master correctly before loading on the offset press. Follow safe procedures.		

TOPIC II: PHOTO MECHANICAL REPRODUCTION (continued) IEGPM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
4. Image transfer:			
- offset	Describe the principle of offset lithography. Use the offset process to reproduce sheets with attention to master mounting, wetting, ink and moisture control and paper feed control. Follow safe procedures. Clean the offset press. Follow safe procedures.		
5. Finishing:			
- binding	Describe some methods for preparing paper and fastening the pages together, such as: saddle sewing, side sewing, saddle stitching, side stitching, adhesive binding and mechanical binding. Bind a product using one of the common processes. Follow safe procedures.		
- embossing	Describe the embossing process used for book covers.		
- laminating	Describe and use the laminating process to cover a document. Follow safe procedures.		
- trimming	Use the paper cutter or corner rounder to trim and enhance products. Follow safe procedures.		

NOTES:

TOPIC 11: PHOTO MECHANICAL REPRODUCTION (continued) IEGPM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- folding	Describe and use some of the common paper folds, such as: single fold, parallel letter fold, accordion fold, panel fold, french fold and booklet fold, in product development. Follow safe procedures.		
- collating	Use a method of collating to gather sheets of paper together in product development.		
- drilling and/ or punching	Discuss the use of a paper drill in preparing sheets for binding. Use the hole punching equipment to prepare sheets for binding in product development. Follow safe procedures.		
7. Societal implications:			
- conservations	Explain why there is a need for conservation and recycling of materials used in the paper industry.		
- ecology	Explain some of the effects on the ecology of the paper manufacturing industry.		
- health and safety	Explain briefly some of the hazards present when working with materials in the Photo Mechanical industry or product development.		
8. Production, consumption cycle. (Should be included in one Graphic Communications topic)	Explain the interrelationship of production, distribution and consumption elements of the Photo Mechanical industry.		

TOPIC II: PHOTO MECHANICAL REPRODUCTION (continued) IEGPM

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
9. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Printing industry.		
- career opportunities	Identify several occupations in the Printing industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Printing industry. (optional)		

NOTES:

TOPIC III: RELIEF PRINTING IEGRP

GENERALIZATION: Relief printing, a relatively traditional method of reproducing a message, has many implications for vocational choices in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Product planning:			
- design	Identify the basic design principles, such as: function, balance, form, proportion, color, contrast and rhythm. Produce simple thumbnail sketches, rough and comprehensive layouts for product development.		
- measurement	Use the printer's point system of measurement in product development.		
2. Image assembly:			
- hot and/or cold type	Prepare exact form of words, using the available composition materials and equipment. Follow safe procedures. Set and lock type characters in the sign press or platen press.		
3. Image transfer:			
- relief	Describe the relief process of printing. Prepare, ink, set the pressure and operate the press in product development. Follow safe procedures.		

NOTES:

TOPIC III: RELIEF PRINTING (continued) IEGRP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	Evaluate the quality of image and make any necessary alterations or adjustments. Follow safe procedures.		
	Clean the press and type using correct solvent. Follow safe procedures.		
- Rubber stamp (optional)	Use a Rubber Stamp Press to produce plastic image carrier through the application of proper heat and pressure. Follow safe procedures.		
	Use a Rubber Stamp Press to convert the plastic matrix and vulcanizing rubber. Follow safe procedures.		
4. Finishing:			
- binding	Describe some methods for preparing paper and fastening the pages together, such as: sewing, stitching, adhesive binding and mechanical binding.		
	Bind a product using one of the common processes. Follow safe procedures.		
- embossing	Describe the embossing process used for book covers.		
- laminating	Describe and use the laminating process to cover a document. Follow safe procedures.		
- trimming	Use the paper cutter or corner rounder to trim and enhance products. Follow safe procedures.		

NOTES:

TOPIC III: RELIEF PRINTING (continued) IEGRP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- folding	Describe and use some of the common paper folds, such as: single fold, parallel letter fold, accordion fold, panel fold, french fold and booklet fold, in product development. Follow safe procedures.		
- collating	Use a method of collating to gather sheets of paper together in product development.		
- drilling and/ or punching	Discuss the use of a paper drill in preparing sheets for binding. Use the hole punching equipment to prepare sheets for binding in product development. Follow safe procedures.		
5. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of materials used in printing.		
- ecology	Explain some of the effects on the ecology of the inks and solvents used in the printing industry.		
- health and safety	Explain briefly some of the hazards present when working with the Platen Press in industry or product development.		
6. Production, consumption cycle. (Should be included in one Graphic Communications topic)	Explain the interrelationship of production, distribution and consumption elements of the Relief Printing industry.		

NOTES:

TOPIC III: RELIEF PRINTING (continued) IEGRP

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
7. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Relief Printing industry.		
- career opportunities	Identify several occupations in the Relief Printing industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Relief Printing industry. (optional)		

NOTES:

TOPIC IV: SILKSCREENING IEGS

GENERALIZATION: Technological developments in silkscreen printing techniques have had an impact on the vocational choices in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Product planning:			
- design	Identify the basic design principles, such as: function, balance, form, proportion, color, contrast and rhythm. Produce simple thumbnail sketches, rough and comprehensive layouts for product development.		
- measurement	Use the printer's point system of measurement in product development.		
2. Image assembly:			
- cold type	Prepare exact form of words, symbols or pictures using the available composition materials and equipment. Follow safe procedures.		
3. Image conversion:			
- stencil	Prepare a stencil, such as: grease paper, plastic film, Tusche, handcut water soluble film, direct photographic or indirect photographic film. Follow safe procedures.		

NOTES:

TOPIC IV: SILKSCREENING (continued) IEGS

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	Prepare a screen using the appropriate size for the product planned. Adhere and mask the stencil on the screen.		
4. Image transfer:			
- screen printing	Describe the principle of the screen printing process. Print the image onto the receiving medium using ink, such as: water soluble ink and/or oil based ink. Follow safe procedures. Clean the screen, squeegee, ink knife and any other equipment using the appropriate solvent. Follow safe procedures.		
5. Finishing	Use available processes such as trimming or mounting to enhance the products. Follow safe procedures.		
6. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of materials used in Silkscreening.		
- ecology	Explain some of the effects on the ecology of the materials used in the Silkscreening industry.		

NOTES:

TOPIC IV: SILKSCREENING (continued) IEGS

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- health and safety	Explain briefly some of the hazards present when working with Silkscreening equipment in industry or product development.		
7. Production, consumption cycle. (Should be included in one Graphic Communications topic)	Explain the interrelationship of production, distribution and consumption elements of the Silkscreening industry.		
8. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Silkscreening industry.		
- career opportunities	Identify several occupation in the Silkscreening industry and research the educational requirements for entry to these careers.		
	Participate in field trips to plants engaged in activities related to the Silkscreening industry. (optional)		

NOTES:

PHOTOGRAPHY

PHOTOGRAPHY

Introduction:

The Photography module will provide the student with an opportunity to work with light sensitive materials under controlled lighting conditions and explore various processes and techniques used in industry. Through "hands-on" activity, the student should gain a basic understanding of processes and techniques used. A topic on Audio-Visual Communication is included to illustrate to the student how the basic processes and procedures can be utilized.

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TOPIC I: CAMERA IEPC

GENERALIZATION: The skillful use of a camera to convey pictorial information that has appeal and visual impact has vocational choice implications in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Light control:	Identify on the camera the parts which are used to control light.		
	Explain the relationship between shutter speed and f-stop.		
	Explain how to establish the camera settings prior to exposing a photograph. Construct a rudimentary box (pin-hole) camera.		
2. Light sensitive materials:			
- photographic paper	Explain the terms: contrast grade, weight, texture and types, as they relate to photographic paper.		
- photographic film	Explain the structure and composition of photographic film.		
3. Product planning:			
- composition	Establish beforehand and describe the main theme or main subject to be used for a photograph.		
4. Image assembly:			
- camera	Use the pin-pole camera to take photographs inside and outside on photographic paper and film.		

TOPIC I: CAMERA (continued) IEPC

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	Use an adjustable camera to take photographs, such as: landscapes, portraits, and still life shots. Follow safe procedures.		
5. Societal implications:			
- conservation	Explain why it is necessary to conserve some of the raw materials used in the Camera manufacturing industry.		
6. Production, consumption cycle. (Should be included in one Photography topic)	Explain the interrelationship of production, distribution and consumption elements of the Camera industry.		
7. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Photographic industry.		
- career opportunities	Identify several occupations in the Photography industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Photographic industry. (optional)		

NOTES:

TOPIC II: DARKROOM IEPD

GENERALIZATION: The photography processing industry involves image conversion, image transfer and print finishing which have vocational implications in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Image conversion:			
- chemical	Describe the action of the various chemicals used when processing films and prints. Process exposed films and prints. Follow safe procedures.		
2. Image transfer:			
- contact printing	Explain the effect of various light conditions on photographic papers. Use available equipment to produce contact prints from negatives. Follow safe procedures.		
- projection printing	Use an enlarger to produce quality projection prints of a desired size from prepared negatives. Follow safe procedures.		
3. Finishing:			
- matte	Produce matte finished prints. Follow safe procedures.		
- gloss	Produce gloss finished prints. Follow safe procedures.		
- laminating	Use the equipment available to laminate a print. Follow safe procedures.		

TOPIC II: DARKROOM (continued) IEPD

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- dry mounting	Use the equipment available to dry mount a print. Follow safe procedures.		
4. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of Photographic materials.		
- ecology	Explain some of the effects on the ecology of the materials used in the Photography processing industry.		
- health and safety	Explain briefly some of the hazards present when working with Photographic materials in industry or product development.		
5. Production, consumption cycle. (Should be included in one Photography topic)	Explain the interrelationship of production, distribution and consumption elements of the Photography industry.		
6. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Photography industry.		
- career opportunities	Identify several occupations in the Photography industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Photography industry. (optional)		

TOPIC III: ADVANCED DARKROOM IEPAD

GENERALIZATION: The techniques, such as: cropping, spot printing, vignetting, dodging, flashing, texturing, solarization, diffusing and multiple printing have vocational choice implications in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Advanced techniques	Produce prints demonstrating a knowledge of some of the following techniques: cropping, spot printing, vignetting, dodging, flashing, texturing, distortion, solarization, photogram and multiple printing. Follow safe procedures.		
2. Finishing:			
- toning	Produce a toned print. Follow safe procedures.		
- matte	Produce matte finished print. Follow safe procedures.		
- gloss	Produce a gloss finished print. Follow safe procedures.		
- laminating	Use equipment available to laminate a print. Follow safe procedures.		
- dry mounting	Use the equipment available to dry mount a print. Follow safe procedures.		
3. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of Photographic materials.		
- ecology	Explain some of the effects on the ecology of Photographic materials used in industry.		

TOPIC III: ADVANCED DARKROOM (continued) IEPAD

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- health and safety	Explain briefly some of the hazards present when working with Photographic materials in industry or product development.		
4. Production, consumption cycle. (Should be included in one Photography topic)	Explain the interrelationship of production, distribution and consumption elements of the Photography industry.		
5. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Photography industry.		
- career opportunities	Identify several occupations in the Photography industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Photography industry. (optional)		

NOTES:

TOPIC IV: AUDIO-VISUAL IEPAV

GENERALIZATION: The preparation of material for multi-media productions such as audio-visual presentations have vocational choice implications in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Product planning:			
- design	Discuss and apply design principles, such as: theme, balance, proportion and rhythm, in the preparation of audio-visual materials.		
2. Production:			
- overhead transparencies	Identify several methods which are commonly used to produce overhead transparencies.		
- sound and video tapes	Explain the basic procedures used to produce sound and video tapes.		
- slide-tape	Discuss the method of production and make one slide-tape presentation.		
3. Presentation:			
- light projection	Explain the principles used in image projection equipment, such as: overhead projector, 16mm film projector and slide projector.		
- sound and video tape	Explain the basic principles used to produce video and audio signals on tapes.		

NOTES:

TOPIC IV: AUDIO VISUAL (continued) IEPAV

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- multiple media	Use the available equipment to present prepared slide-tape program. Follow safe procedures.		
4. Production, consumption cycle. (Should be included in one Photography topic)	Explain the interrelationship of production, distribution and consumption elements of the Audio-Visual industry.		
5. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Audio-Visual industry.		
- career opportunities	Identify several occupations in the Audio-Visual industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Audio-Visual industry. (optional)		

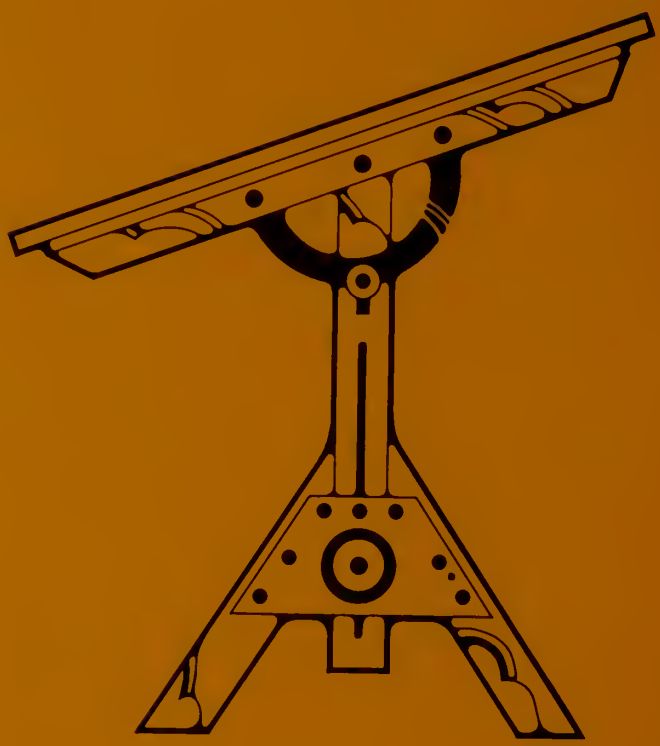
NOTES:

TECHNICAL DRAWING

TECHNICAL DRAWING

Introduction:

Technical drawing is the process of drawing products which industry will produce. It is called the "Language of Industry". Technical drawing is a graphic or picture language. It can be understood by people world-wide.



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*Refers to primary text.

TOPIC 1: FREEHAND SKETCHING IETDS

GENERALIZATION: The preparation and production of Technical Drawings, as a universal means of graphic communication, have a vocational choice implication in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Drafting areas	Explain the differences in drafting in areas, such as: electrical, mechanical, architectural and industrial design.		
2. Image assembly	Produce several good quality pictorial drawing sketches using common drafting lines.		
3. Drawing interpretation	Interpret pictorial drawings such as isometric and orthographic. Explain the use of charts and graphs.		
4. Image transfer	Identify and explain some of the methods used to duplicate drawings, such as: blue print, Ozalid and dry print processes. Reproduce a sketch using available processing equipment. Follow safe procedures.		
5. Societal implications: - conservation	Explain why there is a need for conservation and recycling of Drafting materials.		

NOTES:

TOPIC I: FREEHAND SKETCHING (continued) IETDS

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- ecology	Explain some of the effects on the ecology of the Drafting industry.		
- health and safety	Explain briefly some of the hazards present when working with materials in the Drafting industry or product development.		
6. Production, consumption cycle. (Should be included in one Drafting topic)	Explain the interrelationship of production, distribution and consumption elements of the Drafting industry.		
7. Occupational information:			
- high school	Identify high school programs which offer related career experiences in the Drafting industry.		
- career opportunities	Identify several occupations in the Drafting industry and research the educational requirements for entry to these careers. Participate in field trips to plants engaged in activities related to the Drafting industry. (optional)		

NOTES:

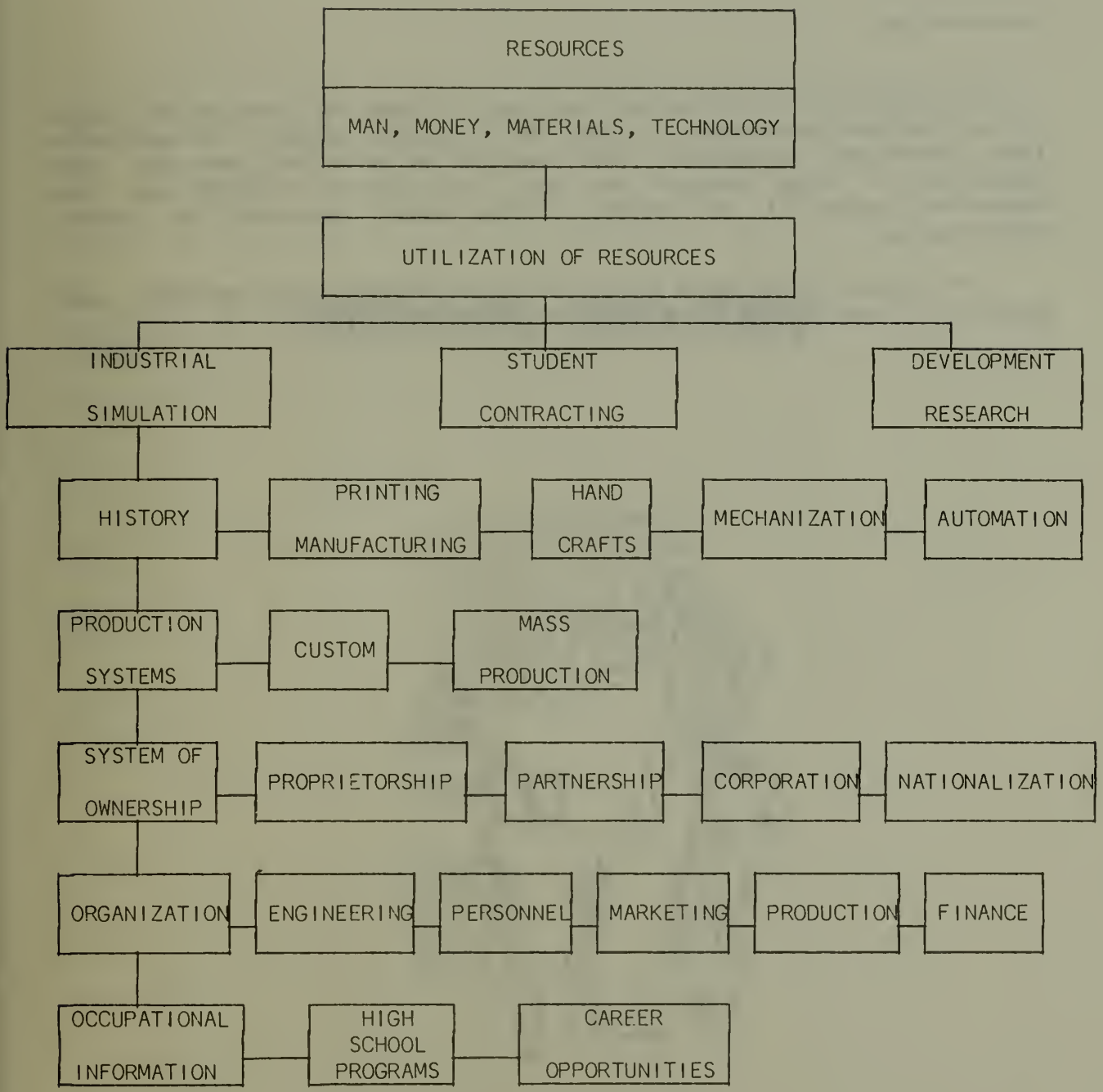
TOPIC II: INSTRUMENT DRAWING IETDI

GENERALIZATION: The interpretation, preparation, production and reproduction of Technical drawings have a vocational choice implication in a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. Drawing interpretation	Read and interpret technical drawings.		
2. Image assembly	Use drafting instruments to demonstrate basic drafting skills.		
	Produce several quality pictorial drawings using basic drafting instruments.		
	Complete at least one drawing displaying dimensions, lettering, title block and border.		
	Use a drafting machine to produce a drawing.		
3. Image transfer	Identify and explain some of the methods used to duplicate drawings, such as: blue print, Ozalid and dry print processes.		
	Reproduce a drawing using available processing equipment. Follow safe procedures.		
4. Societal implications:			
- conservation	Explain why there is a need for conservation and recycling of Drafting materials.		

NOTES:

FIELD OF STUDY: SYNTHESIZING

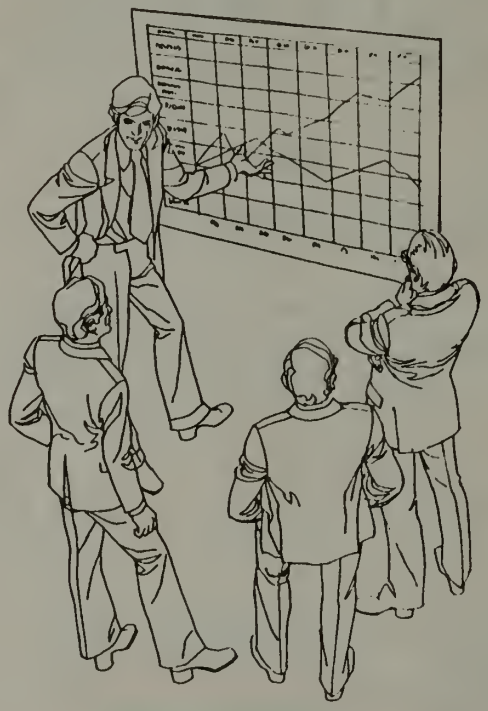


SYNTHESIZING

Introduction:

The synthesizing modules are designed to show the inter-relationships of the various technologies as well as to enable students to synthesize their accumulated knowledge in the solution of practical problems. The objectives of these modules are best fulfilled by students who have completed several of the modules in the power, materials and graphic technologies.

Since each synthesizing module is quite different from the next, each module will have its own objectives and suggested approach.



INDUSTRIAL SIMULATION

INDUSTRIAL SIMULATION

Introduction:

Contemporary systems of manufacturing are often taken for granted by many teachers who feel that its vast organizations are too difficult for junior high school students to comprehend. Yet industry will provide most of the students with their jobs in the future. It would therefore seem imperative that adequate training be given for these future roles. This course has been developed to help demonstrate the organizational and production techniques used by today's industry.

A module in Industrial Simulation may be developed independently. To have been involved in a course of this nature should prove to be beneficial to any student taking a Production Science course at the high school level.

OBJECTIVES FOR INDUSTRIAL SIMULATION

A module of this nature can be made very flexible. It should, however, attempt to:

1. Develop an understanding of the relationship of the various technologies used to produce a product.

2. Recognize the need for students to work safely and co-operatively with one another.

3. Simulate the roles of various workers within a manufacturing organization.

4. Encourage students to develop their interests and abilities as they relate to the kinds of work found in industry.

5. Demonstrate that manufacturers have a social responsibility to make a safe product and to use resources wisely.

SUGGESTED APPROACH

The completion of a module in Industrial Simulation can be very rewarding for the teacher and the students. It is recommended, however, that a teacher not attempt to run more than two classes for the first time as the amount of work may be overwhelming if the teacher starts with the establishment of a company at the very beginning. The formation of the company and the organization of departments which are student-run should be left for the end of the module. Begin by introducing the concept of mass production by doing a production on several small products designed and structured by the teacher. The use of flow charts proves to be invaluable for establishing production runs.

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Junior Achievement Kit

TOPIC I: INDUSTRIAL SIMULATION IEIS

GENERALIZATION: Products are produced by different systems in order to meet the needs of a productive society.

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
	The student will:		
1. History:			
- primitive manufacturing	Find ways in which man learned to use tools as an extension of his hands and later used simple tools to make more complex ones.		
- hand crafts	Note the development of specific crafts in various regions and the organization of trade groups such as guilds.		
- mechanization	List inventions and accomplishments which made it possible for the change from hand work to machine work in factories.		
- automation	Discuss how the need to produce more quickly and efficiently leads to automation. Describe the type of equipment used in automation such as: automatic transfer devices, punching tape systems and computer programming.		
2. Production systems:			
- custom	Locate industries such as space, housing and ship-building which manufacture individual products to meet the specific needs of the customer.		

NOTES:

TOPIC I: INDUSTRIAL SIMULATION (continued) IEIS

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
- mass production	List the factors which characterize mass production such as: standardization of parts, specialization of skills, elimination of wasted effort, specialization of tools, high volume production and low profit per unit returns.		
3. Systems of ownership:			
- proprietorship	Discuss that the system of ownership where one person owns and operates the company is called proprietorship.		
- partnership	Discuss that the system of ownership where two or more owners are each responsible for the operation of the company is called partnership.		
- corporation	Discuss that in a corporation, shareholders own the company while an elected Board of Directors are responsible for operation of the company.		
- nationalization	Discuss that in a nationalized company all people in the country or province own a portion of the company. Identify one or two companies under each system of ownership. Participate in the organization of a corporation, the preparation of products for production and sale, and the liquidation of the company.		

NOTES:

TOPIC I: INDUSTRIAL SIMULATION (continued) IEIS

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
4. Department organization:			
- engineering (Research and Development)	Discuss the responsibilities of engineers in the selection of a suitable product for manufacturing, organizing a system of production and the design of needed jigs and fixtures.		
- personnel	Discuss the responsibilities of personnel in assigning and training workers in safe practices to perform specific tasks.		
- marketing	Discuss that the responsibility of a marketing department is the identification of the number of products to be made, promotion of product sales and marketing of the product.		
- production	Discuss that the responsibility of a production department is to manufacture a number of products using the most efficient methods possible.		
- finance	Discuss that the responsibility of the finance department is the sale of shares and recording of all credits and debits.		
	Participate in as many departments as required to carry out the effective operation of the company.		

NOTES:

TOPIC I: INDUSTRIAL SIMULATION (continued) IEIS

CONCEPTS/SUBCONCEPTS	LEARNING TASKS	HOURS	REFERENCES
5. Occupational information:			
- high school	Identify high school programs available in the related career fields.		
- career opportunities	Identify several occupations in the related career fields and list the educational requirements.		
	Participate in role play related to union-management problems, etc. (optional)		
	Participate in field trips to industrial plants. (optional)		

NOTES:

STUDENT CONTRACTING

STUDENT CONTRACTING

Introduction:

Student Contracting provides the necessary flexibility to allow for individual differences. After a student has completed the required information in the Power, Graphic Communications and Materials Technologies, it is possible for the student to expand his/her knowledge in a particular area according to the terms specified by the teacher and student.

OBJECTIVES FOR STUDENT CONTRACTING

1. To provide an opportunity for students to pursue their vocational interests and skills.

2. To provide an opportunity for the students to synthesize their accumulated knowledge in the solution of practical problems.

SUGGESTED APPROACH

Student contracting should be a program developed by a process of student-teacher consultation and should not imply that the student simply does what he/she wants to do. The program should go through a developmental stage beginning with "closed contracts" (The student selects from a list of teacher developed options). The second stage of contracting is the "modified contract". (Student selects and further develops the options identified by the teacher). The final stage is the "open contract". (Student defines the contract in consultation with the teacher). Some students may not be able to go through all three stages and work only at the closed contract level, while others complete all three stages.

To aid in the development of student contracts, individual student profiles should be completed in order to determine what experiences the student has had previously. The student's contract should reflect synthesizing experiences.

DEVELOPMENTAL RESEARCH

DEVELOPMENTAL RESEARCH

Introduction:

Industrial education is a field of study that should be constantly changing if it is to be relevant for a productive society. This means then, that new content and curriculum materials need to be developed and tested on a continuing basis. To allow time for this type of activity, provision was made in the course for a nine to twelve week unit entitled "Developmental Research."

This time-block gives the teacher the opportunity to develop new and experimental materials, following the approval of the Consultant of Industrial Education and the school principal.

OBJECTIVES FOR DEVELOPMENTAL RESEARCH

To develop new curriculum content for junior high school industrial education.

SUGGESTED APPROACH

The Research unit is not circumscribed by any formal content. The course is entirely developed by the teacher. However, it must be properly documented as a research unit and should be developed using the format of the present guide. THE TEACHER MUST SUBMIT AN OUTLINE OF HIS PROPOSAL TO BOTH THE CONSULTANT OF INDUSTRIAL EDUCATION AND THE SCHOOL PRINCIPAL FOR THEIR APPROVAL BEFORE BEGINNING.

A record should be kept of activities done by the student so that an evaluation becomes meaningful.

An evaluation of the unit with possible implications for the curriculum should be submitted to the Consultant of Industrial Education at the end of the experimental period.

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CURRICULUM GUIDE